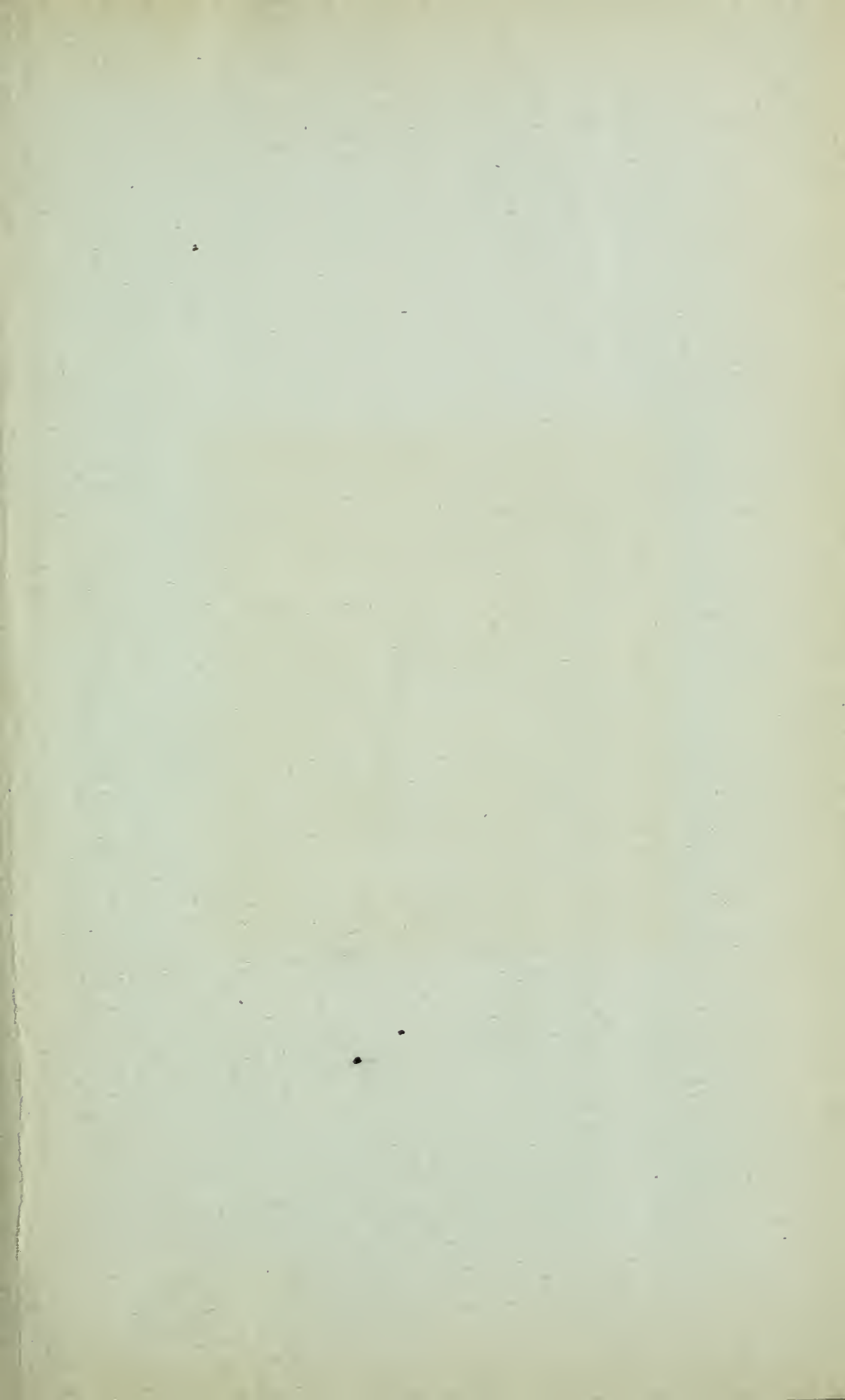


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THE
VICTORIAN NATURALIST:

THE JOURNAL & MAGAZINE

OF THE

Field Naturalists' Club of Victoria.

VOL. XXVII.

MAY, 1910, TO APRIL, 1911.

Hon. Editor: MR. F. G. A. BARNARD.

The Author of each Article is responsible for the facts and
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Mr. John. G. G. G.

THE VICTORIAN NATURALIST.

VOL. XXVII.

MAY, 1910, to APRIL, 1911.

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ERRATA:

Page 33, line 21—For “*capitella*” read “*capitellata*.”

Page 33, line 32—For “*Billardiera*” read “*Billardieri*.”

Page 136, line 8 from bottom—For “HETEROCERA” read “HETEROPTERA.”

Page 216, line 1 of footnote—For “1 mm” read “.1 mm.”

The Victorian Naturalist.

VOL. XXVII.—No. 1. MAY 5, 1910.

No. 317.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 11th April, 1910.

The president, Prof. A. J. Ewart, D.Sc., occupied the chair, and about 120 members and visitors were present.

CORRESPONDENCE.

The hon. secretary read a letter which had been received by the committee from Mr. R. T. Baker, F.L.S., curator of the Technological Museum, Sydney, in which he offered to give a lecture before the Club on some botanical subject in July next, and said that the committee had accepted the offer, and that details of the arrangements would be announced later.

A letter was read from the Conservator of Forests, in reply to a communication from the committee with reference to the preservation of the vegetation along certain portions of Monbulk Creek, in which he stated that instructions had been issued that the area in question should be left untouched; and, further, that he would be pleased, at any time when brought specially under his notice, to have suitable forest areas set aside as sanctuaries for animals and birds.

REPORTS.

A report of the excursion to Heidelberg on Saturday, 19th March, was given by the leader, Dr. J. C. Kaufmann, who stated that there was a good attendance of members, and that an interesting afternoon had been spent. A very large number of pond-life forms had been met with, and the finding of *Vorticella nebulifera* showing conjugation of macro- and micro-zoids was an unusual occurrence.

A report of the excursion to Sydenham on Saturday, 9th April, was given by the leader, Dr. T. S. Hall, M.A., who reported a very good attendance of members. The object of the excursion was to visit the basalt columns locally known as "The Organ Pipes," on Jackson's Creek, near Holden. It was found that since the visit of the Club recorded in the *Naturalist* for November, 1900 (vol. xvii., p. 120), the positions of two at least of the columns had been altered, owing to several feet of their bases having been carried away by flood waters. This had allowed the whole columns to drop down the face of the cliff, so that their tops are now several feet below their previous position, but fortunately without further damage. An interesting chat about the geology of the district ensued, in which the erosion of the basaltic plain by the various streams was discussed. Owing to recent agricultural operations, a number of quartzite chips, which had

probably been used by the aboriginal inhabitants of the district, were picked up, and a small mill-stone was fortunately saved from a geologist's hammer. Future visitors would do well to keep within the railway enclosure for about a mile before turning north, as a considerable amount of farming has recently taken place in the district, and one cannot make a bee-line across the plain as formerly.

A report of the junior excursion to the Zoological Gardens on Saturday, 2nd April, was given by the leader, Mr. J. A. Leach, M.Sc., who reported a very good attendance of juniors, who were greatly interested in the various birds and animals.

The hon. librarian acknowledged the following additions to the library:—"Biography of a Silver Fox," by E. T. Seton; "Wild Life at Home—How to Study and Photograph It," by W. Kearton; "Wild Life in Australia," by D. Le Souëf; "The Life of the Bee," by Maeterlink; "Robert Dick," by S. Smiles; "Story of the Heavens," by Robert Ball; "Mendel's Principles of Heredity," by W. Bateson, M.A.; "Ecology of Plants," by E. Warming, Ph.D.; "Text-Book of Petrology," by F. H. Hatch, Ph.D.; "The Naturalized Flora of South Australia," by J. M. Black—all purchased; "Fragmenta Phytographiæ Australiæ," by F. von Mueller, from the Government Botanist; "Weeds, Poison Plants, and Naturalized Aliens of Victoria," by Prof. A. J. Ewart, D.Sc., from the author; "Records of Geological Survey of Victoria," vol. iii., part 1, from Department of Mines, Melbourne; *Journal of Agriculture*, Victoria (September, 1909, to April, 1910), from Department of Agriculture, Melbourne; "Records of Geological Survey of New South Wales," vol. viii., part 4 (1909), from Department of Mines, Sydney; *Agricultural Gazette of New South Wales* (November, 1909, to April, 1910), from Department of Agriculture, Sydney; "Nests and Eggs of Birds found Breeding in Australia and Tasmania," vol. ii., parts 3 and 4 (Index), by A. J. North, C.M.Z.S., from Trustees Australian Museum, Sydney.

At this stage Lieut. Otes and a party of about forty naval cadets from the Japanese warships arrived, and were cordially welcomed by the president, Lieut. Otes briefly replying.

PAPERS READ.

1. By Mr. A. D. Hardy, F.L.S., entitled "Notes on Ramsden's Cave, Cape Patten."

The author, by means of a fine series of lantern slides, described the nature of the country in the vicinity of Cape Patten, on the eastern coast of the Otway peninsula, and gave a more minute description of the cave, which is situated high up in the face of a cliff. He considered the cave was the result of wave action tunnelling into the sandstone cliff, followed by an almost vertical fall of rock between joint planes causing a high-level cavity, the pool resulting from the talus at the entrance forming a dam.

2. By Mr. D. McAlpine, entitled "Notes on the Smuts of Australia."

The author said that just four years ago he had given some notes on the Rusts of Australia, and having now finished a work on the Smuts, desired to bring a few facts concerning them under the notice of the members. He pointed out the importance of the study of all the forms of fungi occurring in Australia, and stated that the stinking smut of wheat causes a loss in Victoria of at least £50,000 a year. He briefly described the main differences between a rust and a smut, and stated that 68 species had been recorded for Australia, of which 46 had been found in Victoria. He also mentioned the modes of infection and the means of prevention, and exhibited a fine series of illustrations of the different species.

The Chairman congratulated the author on the results of his investigations, and remarked on the great importance of the work yet to be done as regards the fungi.

NATURAL HISTORY NOTE.

Rev. F. W. Ramsay, of Samarai, Papua, described a model outrigger sailing sea-canoe and other objects exhibited by Mr. R. W. Armitage, giving particulars as to their methods of construction, uses, &c.

EXHIBITS.

By Mr. R. W. Armitage.—Model of a Test Island (Papua) outrigger and platform sailing sea-canoe, made by the natives, and for comparison a model of a river and sea outrigger canoe; tapa cloth, string netted bag, necklace of banana seeds, necklace of sea-shells, necklace of shells and seeds, clay cooking pot, and New Guinea money, from Samarai, Papua.

By Mr. F. G. A. Barnard.—Aboriginal mill-stone from Sydenham; fruits of Gooseberry Cucumber, *Cucumis myriocarpus*, Naudin (introduced African plant), from Jackson's Creek, Sydenham.

By Mr. C. J. Gabriel.—Marine shells—series of *Oliva ornata*—from N.W. Australia.

By Mr. A. D. Hardy, F.L.S.—Gypsum crystals (selenite), from "frosting" of walls of Ramsden's Cave, Cape Patten, and fresh-water algæ, *Pleurococcus*, sp., and empty frustules of diatom, *Hantzschia amphioxys*, from water of cave, in illustration of paper.

By Mr. H. Jeffery.—Specimen of bracken, *Pteris aquilina*, 9 ft. in height, from Sassafras Gully, Dandenong Ranges.

By Mr. D. McAlpine.—Specimens of stinking smut of wheat and flag smut of maize; nine frames of illustrations of the smuts of Australia, in illustration of paper.

By Mr. C. L. Plumridge.—Blossoms of orchid *Eriochilus autumnalis*, from Blackburn.

After the usual conversazione the meeting terminated.

NOTES ON RAMSDEN'S CAVE, CAPE PATTEN.

By A. D. HARDY, F.L.S.

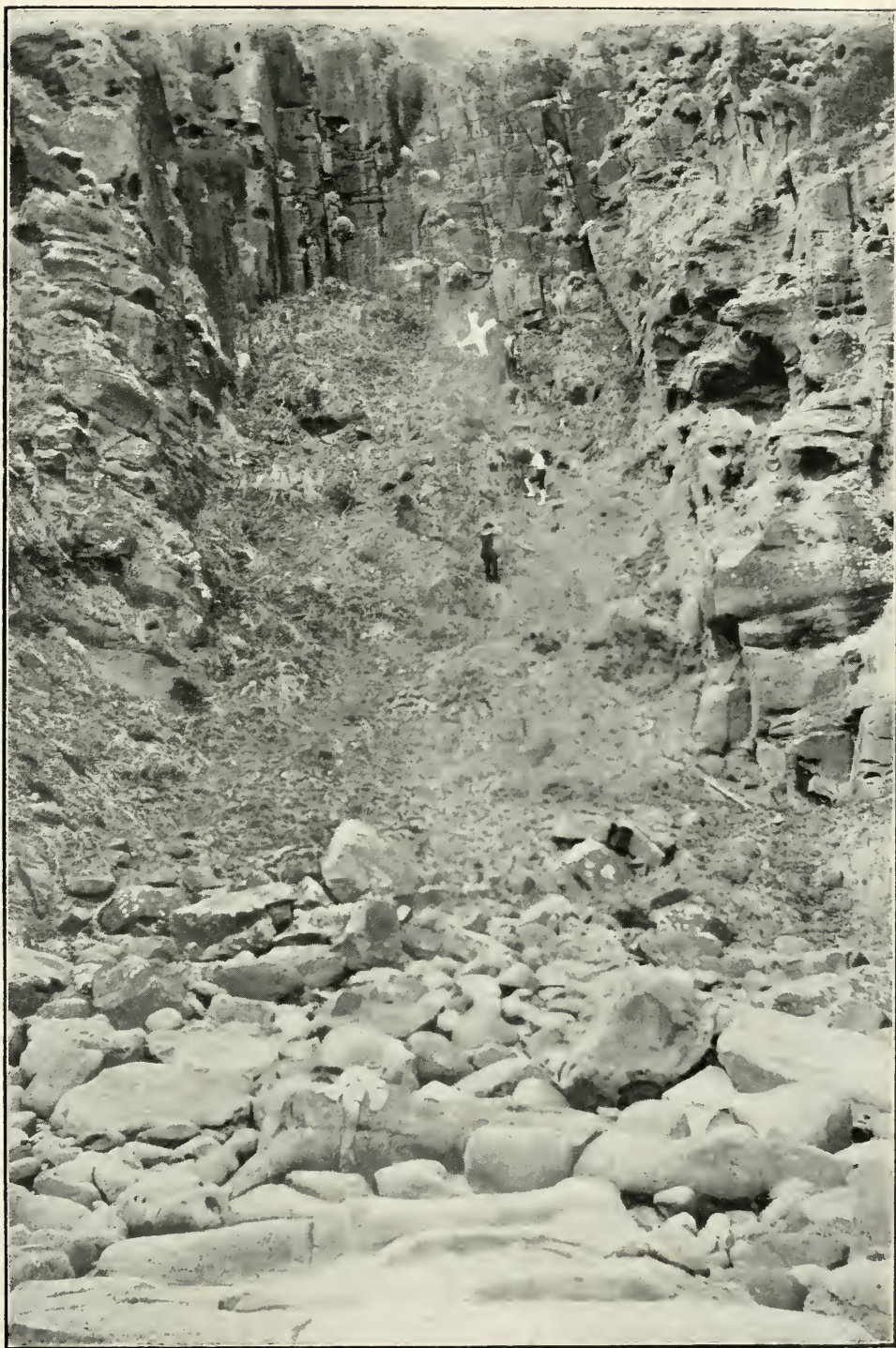
(Read before the Field Naturalists' Club of Victoria, 11th April, 1910.)

THAT portion of the Victorian coast stretching north-easterly from Cape Otway to Point Grey is well known for its picturesqueness. Here we find cliff and beach, rock platform and sandy shore in rapid succession, but the cliff formation predominates, averaging at least 100 feet in height, while in many places vertical precipices rise to greater heights. The spurs, which run south-easterly from the main Otway ridge, are truncated at the shore line, and between them many streams have cut deep valleys, which are now well timbered. The surplus water of the copious Otway Forest rains finds its way tumultuously to the coast through ferny ways, with frequent cataract and abrupt fall, screened by an almost impenetrable jungle of *Aster*, *Senecio*, *Pomaderris*, *Prostanthera*, *Coprosma*, &c., canopied by tall acacias and eucalypts, in places descending at the rate of about 300 feet to the mile. Emerging from the State Forest, these streams run in the stony bottoms of timber-denuded valleys, through the seaward belt of selected lands, to gently meander a little near the shore, in places, across what appear to be raised beaches, or, in others, to burst boldly from the mouths of steep, stony-sided gullies, which form gaps in the high coast-land. Other interruptions in the line of cliff are those which have been formed by the sea; the various blowholes, the Loch Ard Gorge, of fateful memory, on the other side of Cape Otway, being examples, to say nothing of the numerous small caves and grottoes which the waves have fretted here and there.

The whole district is a delightful one, as visitors to Lorne and Apollo Bay are well aware, and so it happened that the discovery of a new feature some little time ago caused considerable interest among tourists and others. But the reports were of such an exaggerated nature that persons with some knowledge of the geological formations were sceptical—an attitude subsequently justified by the rough examination which I was able to make in March, 1909. The measurements, by means of aneroid, compass, and tape—were in parts obtained with difficulty, and are, as a whole, to be taken as approximate only, and the accompanying plans as diagrammatic. The latter are offered as a help to those who desire to include this feature in a physiographical examination of the coast, and to venturesome tourists who do not object to considerable discomfort, including a wetting and a bruise or two.

In the vicinity of Cape Patten, which is situated between Lorne and Krambruk (better known as Apollo Bay), are to be found some striking examples of marine denudation. "The Blowhole," so called, is a gulch reaching from the sea at almost low water to the foot of the cliff. It is about 30 feet wide, and is the site

PLATE I.

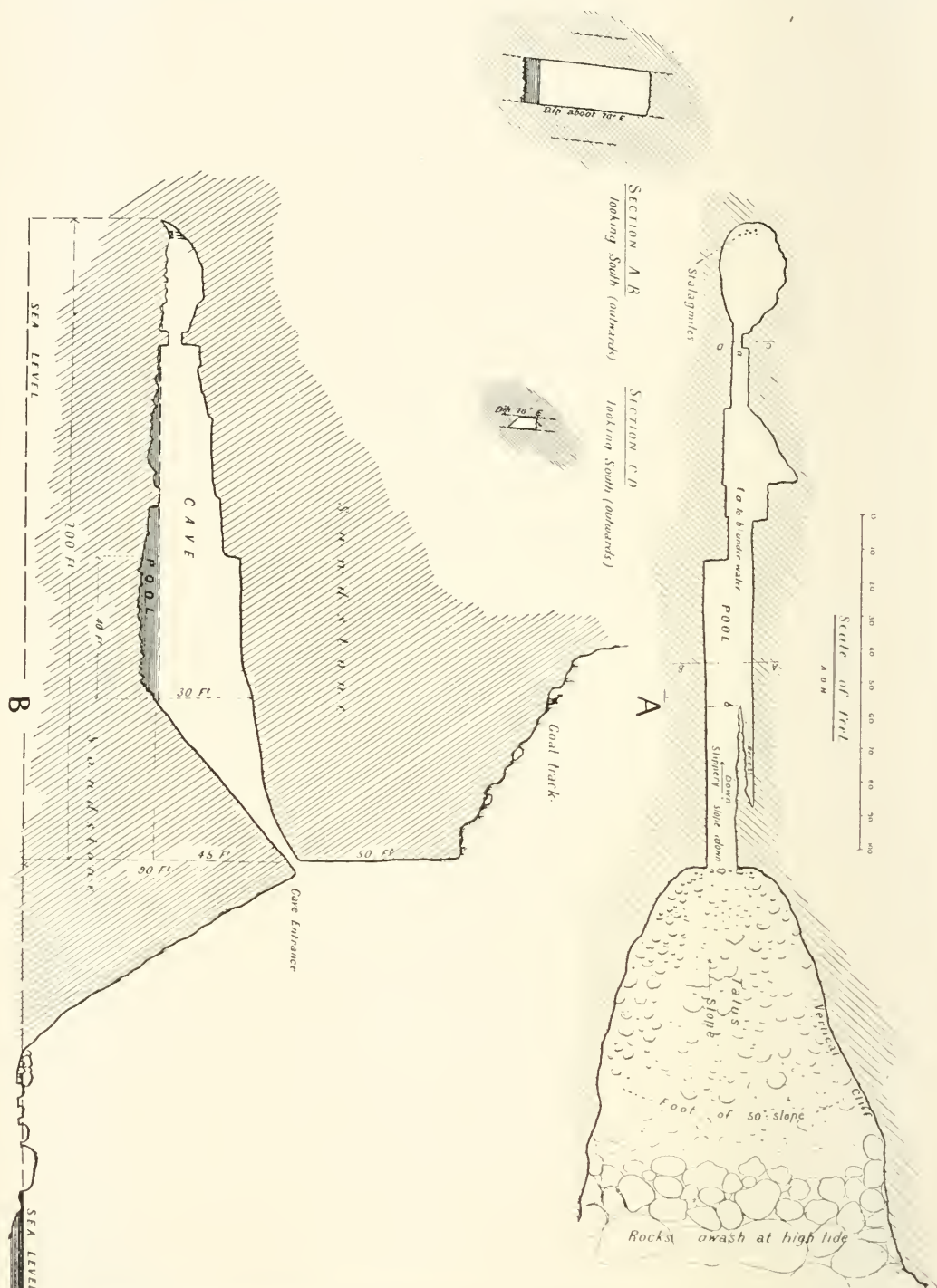


RAMSDEN'S CAVE, CAPE PATTEN.

(Entrance indicated by X.)

Photo. by CARTER BROS., SKENE'S CREEK.

PLATE II.



RAMSDEN'S CAVE. CAPE PATTEN.

A.—Horizontal Section.
 B.—Vertical Section.

of alteration of dip and strike of the rocks.* This gulch blocks the way of continuous travel at low tide at the foot of the cliffs, even to pedestrians. To circumvent it one must climb over the spur which terminates in Cape Patten. On the Lorne side of the gulch is a small cave at sea level, which was described in the *Victorian Naturalist* of March, 1905 (vol. xxi., p. 151).

Before reaching the Blowhole, from the Apollo Bay side, one sees a small indent extending northerly a few chains into the cliff, and open to the sky, with masses of rock receiving the force of the waves at high tide near the entrance, where it is about three chains wide. The walls converge until the indent is, at its extremity, about half a chain wide. From a point about 90 feet up the cliff a steep slope—the surface of a talus—descends. Above the talus the cliff is vertical for a height of 50 feet or more, and above that, though not vertical, the Cape Patten headland rises irregularly to perhaps 500 feet.

Round this steep brow, above the cliff, runs a mountain path, known as "The Goat Track." It was owing to Mr. Ramsden seeing a goat standing on the top of the talus that he descended by a circuitous route to the shore, and climbed up to see if the animal had a kid concealed there. The goat had meanwhile come down and disappeared, but Mr. Ramsden discovered the small hole opening to a cave, which could not be seen either from above or below. The cave has, therefore, been named after him. With much difficulty he subsequently got a rope attached to a rock, and with this as a help the cave may be reached.

The opening is about 8 feet wide and irregular in height, but enough to allow one to crawl through and descend a damp, rock-strewn slope of about 40 deg. for a distance of 80 feet or so to the edge of a pool of water. Meanwhile the ceiling, which at first inclines a little with this slope, runs inwards more or less horizontally, so that as the slope is descended the chamber increases in height to about 30 feet. The side walls strike northerly, and dip easterly at about 70 deg. Between these the pool lies on a bottom of jagged rock, in the interstices of which a soft, yielding mud makes a treacherous foothold and the spraining of an ankle possible. The interior is lost in gloom, but with the aid of a torch one may see at the further side of the pool—here 12 feet wide and over 5 feet deep in parts—the end wall, which closes the chamber partly but leaves a passage with the same steep walls and floor below water. The musical echoing splash of a drop falling somewhere from the ceiling at about half-minute intervals was the only sound heard, except the noisy flight of a startled blow-fly which had sought the cave for shelter.

* V. Stirling, "Special Report on Geology of Apollo Bay," accompanying Quarter Sheet A1, 47 (1901).

To proceed one must plunge in and either wade or swim to the end of the 40 feet section of the pool where the water is shallower, and whence it extends at varying depths, according to the irregularities of the rough rock on the bottom, through passages mostly with parallel walls, but in one place opening out into a rudely triangular chamber 20 feet wide, beyond which the passage formation is resumed, until at the entrance to the last compartment there is a narrow way through which a man of more than average size cannot pass with a whole skin. This narrow way has been christened "Martin's Jamb," because of an incident of local interest in which Mr. Martin, J.P., of Apollo Bay, figured as principal actor.

The inner chamber differs from the others in bearing some little resemblance to a solution cave, the illusion being caused by the presence of a few stalagmites and stalactites at its northern extremity, the former about 12 inches high and a couple of inches thick and blunt topped, and the latter of the shape and colour of parsnips a couple of feet long, and coloured brown in parts as though ferruginously stained—these, and the somewhat dome-shaped ceiling, together with a frosting of small gypsum crystals (selenite) on the walls. These crystals occur in other parts of the cave, but not so conspicuously. There seems to be no water entering the cave except the drip from the main chamber ceiling; this our improvised torch illumined sufficiently to show that no stalactites had formed. Throughout there is a high-water mark about 3 feet above the surface of the pool, but the present level has not altered materially in the twelve months during which it has been under observation. The sources of supply are the ceiling drip, ooze slowly descending the walls, and southerly rain, of which a little enters directly, and more, arrested by the vertical cliff-face, runs down and in. This supply evidently balances the loss by evaporation and soakage. Evaporation is small, the air temperature of the cave in March last being about 50 deg. F.; soakage through the floor is retarded by the accumulation of fine mud, which has choked the crevices. Yet it is probable that a stream of water at one time entered from a creek or marsh, if the results of microscopical examination of a sample of the pool-water may be taken as satisfactory.

The sample was collected by Mr. Ramsden in March, 1909, in, he assures me, a clean, dry medicine bottle. The water when received was clear as crystal, and was not critically examined until the end of the following summer, when a film of *Pleurococcus* had formed on the glass, the bottle having been tightly corked and exposed to direct sunlight.

While examining this green alga I was surprised to find associated with it numerous empty frustules of a diatom which agrees with descriptions given by Schmidt, Van Heurck, and by G. S. West of *Hantzschia amphioxys* (Ehrenb.), Grun. Not a single living

specimen could be seen, and the first conclusion I came to was that the diatom had been carried into the cave from some sunlit body of water. I have not yet had an opportunity of investigating the alternative theories, viz.—(1) That there are living diatoms in the pool, and that the specimens examined died after collection and during the many months that elapsed before examination;* and (2) that *H. amphioxys*, regarded by West as “the only fresh-water species of the genus,” but by Van Heurck as inhabiting “fresh and brackish water in England and Ireland,” may be or may have been a marine species also,† and has reached the cave-pool through its fossil remains having been released from the surrounding rock. With this in view, I crushed some of the cave-rock, but found no trace of diatoms. Further investigation may clear up this point.

Though numerous gypsum crystals on the walls indicated the presence of fossil shells, I saw no sign of stratified beds of these latter, but, with a poor torch, and mud on the walls, much may have remained obscured.

This high-level cave appears to have been formed as follows:—There was first the undermining of the cliffs until the indent was cut, and afterwards until a tunnel of about 200 feet was bored. The great thickness of the superincumbent rock had resisted all attempts at blowhole formation, but the effect of intermittent air compression and wave shock in the tunnel was the loosening of the rock immediately above, and this fell, sliding down between the joint planes at 70 deg. of dip, and thus more than filling the old tunnel, and, with the falling of the cliff face continuing, a talus was formed protecting the lower part of the scarp, and further weathering of the upper cliff added to this, and also formed an internal talus, which slopes to the edge of the pool, about 45 feet above sea level. The ridge formed by the upper part of this accumulation almost completely closed the cave. At first the water which entered got away rapidly by soakage, which was soon retarded by the sediment filling the crevices with fine mud.

To those who desire to inspect this novelty I would advise the inclusion of this with many other bye-excursions of interest to be made from Apollo Bay, whence, taking advantage of newly made cuttings in the hillside and the rock platform at low tide, vehicular traffic, in the hands of a good driver, is practicable as far as Sugar-loaf Hill, a suitable camping place, or to Mr. Ramsden's house, where refreshments, information, and necessary assistance may, by pre-arrangement, be obtained. Mr. Ramsden's address is Skene's Creek.

* A fresh but smaller sample examined on arrival contained no diatoms, though collected in the same way a year later.

† The species was scarce in the Yan Yean Reservoir as a littoral alga in December, 1905, as recorded by G. S. West.

For some of the photographs used for the lantern slides I am indebted to Messrs. Carter Bros., of Skene's Creek, and three have been reproduced, by courtesy of the Mines Department, from Mr. Stirling's geological report, and I have to thank Mr. Ramsden and Mr. Taylor, of Mt. Sabine, for their assistance in exploring the cave, as without their help it would have been impossible to obtain even rough measurements. As it was, a combination of chattering teeth, stiff fingers, poor torchlight, and wet note-book caused many interesting details, such as a search for fossil layers, to be neglected.

BIRDS AND DRAGON-FLIES.—Mr. René Martin, the great French authority on *Odonata* (Dragon-flies), is making a study of birds which eat these insects, and has asked me if I can give him any Australian notes on the subject. During the whole time I was collecting for Mr. Martin I cannot call to mind a single instance of a bird chasing or eating a dragon-fly. If any readers of the *Naturalist* have noticed such a thing, or should notice it in future, I would be glad if they would communicate with me, giving me the name of the bird, and, if possible, the kind of dragon-fly eaten.—F. L. BILLINGHURST. Bacchus Marsh, 5th April, 1910. [In the *Australasian* of 23rd April, page 1059, Mr. T. Tregellas, a well-known bird observer, mentions seeing a Sacred Kingfisher capture a large dragon-fly at Wonga Park, near Warrandyte, during a recent outing.—ED. *Vict. Nat.*]

NATURAL HISTORY AT SHEPPARTON.—The Minister of Agriculture was recently requested by the Shepparton branch of the A.N.A. to allow an officer of the department to visit that town for the purpose of giving a lecture on "Natural History" in furtherance of a movement to start a Field Naturalists' Club in the town. Mr. C. French, jun., Assistant Government Entomologist, was deputed to go, and, at the request of the Government Entomologist, Mr. F. G. A. Barnard accompanied him, and shared in the demonstration. The latter, in an extremely practical address, pointed out what natural history means, and what might be done in the district towards increasing the interest in that branch of science. Mr. French gave a number of valuable notes in explanation of a fine series of lantern slides illustrating many of the useful birds found in the district. The lecture attracted an audience of about 350 persons, a large proportion being young people, who seemed greatly interested in the subject, while the fine series of specimens exhibited by the Entomological Branch added greatly to the value of the demonstration. It is confidently hoped that the formation of a local natural history society will follow at an early date.

NOTES ON THE SMUTS OF AUSTRALIA.

BY D. McALPINE.

(Read before the Field Naturalists' Club of Victoria, 11th April, 1910.)

It is exactly four years since I read a paper before this Club on the Rusts of Australia, based upon a work then issued, and now I propose to deal similarly with the Smuts of Australia.

It may be questioned at the outset whether this is a suitable subject for a Field Naturalists' Club, seeing that it is mainly a record of work done in the laboratory, and I may say here that this view has weighed so much with me that I offer it as an excuse for my comparatively rare contributions to the pages of the *Victorian Naturalist*. But, on the other hand, I hope to show you that, just as "the hewers of wood and drawers of water" have helped to render this fair continent of ours habitable and prosperous, so the field naturalist has rendered possible much of the work that has been done in natural history by his or her observations, collections, excursions, and descriptions. There is no hard and fast line to be drawn between what is observed by the naked eye and what may be seen when the eye is supplemented by the microscope, and the microscopic evening held at our last meeting is a tacit admission of this truth.

Let it be understood, then, that my notes on the Smuts of Australia will deal principally with those features which are observable in the field, and for their deeper meaning I refer you to the photographs of the various smuts and their spores on the walls.

Just as the cinematograph has made us familiar with scenes and industries, and even scientific facts, which many of us would not otherwise have an opportunity of becoming acquainted with, so I consider that the photographs of the smuts and their minute structure have, to a certain extent, bridged the gulf between the field and the laboratory worker. I believe it is the aim, or ought to be the aim, of this Club to have every branch of natural history represented in its operations, but there is no doubt that in recent years the fungi have been sadly neglected.

In a suggestive paper by Dr. Hall, on "Ungarnered Grain," in the January number of the Club's journal, there are a number of valuable hints as to fruitful fields of research in our native fauna and flora, but the fungi are not even mentioned, although many of them are being swept out of existence by the ruthless destruction of our forests. It is about time that the "*Flora Australiensis*" was supplemented by accurate descriptions of the lower cryptogams, at least as complete as those of the higher cryptogams and flowering plants, and I for one will never rest content until the fungus-flora of Australia has received that recognition which its importance and its bearing on our various natural resources demand. It is hardly necessary to tell you that the study of the smuts, for instance, is not a mere academic exercise, for they are

responsible every year for a considerable reduction in the yield of our cereal crops, which, however, can be largely prevented by methods of treatment based upon a knowledge of their life-histories. There is a deal of ungarnered grain owing to their ravages, for the diseases caused by smuts are among the most destructive, since they often destroy the grain itself, which is the chief object of cultivation.

It is difficult to form a reliable estimate of the losses caused by the smuts, but in one year I reckoned that the stinking smut of wheat alone cost Victoria £50,000, and Swingle has estimated the annual loss by oat smut to the United States at £3,384,521.

DIFFERENCES BETWEEN SMUTS AND RUSTS.

There is so much in common between the smuts and the rusts that they are often confounded. They are both parasitic fungi, both produce clusters of spores, which are often black or dark coloured, and the spores of both germinate in a somewhat similar fashion. It is not to be wondered at, then, that the ordinary observer does not distinguish the difference, and while it is necessary to make a final appeal to the microscope to settle the difference, I consider that, for all practical purposes, smuts may be generally recognized by the black masses of spores, all of one kind, and not a variety of forms, as happens in many of the rusts, especially if one has familiarized himself with the naked-eye appearances in a good herbarium. Smut is readily recognized in the inflorescence of grasses, for instance, which is often converted into a sooty, powdery mass, from the development of the spores in that particular region.

It may be some consolation to the novice to know that even experts may be misled by the resemblance, and have mistaken smuts for rusts, and *vice versa*. Thus, there is the well-known flag smut, which occurs on the wheat, and it is quite commonly called "black rust" by farmers and others, but the character of the spores, seen under the microscope or in a good photograph, surrounded by its bladder-like cells, would exclude it from the rusts at once. Then the not uncommon maize rust has been mistaken for a smut by such eminent investigators as Berkeley and Broome and Masee. Mr. Bailey, of Queensland, sent a specimen to Britain for determination, and he wrote me concerning it as follows:—"In the year 1878 the maize about Brisbane was infested with a *Uredo*, which Messrs. Berkeley and Broome determined to be *Uredo maydis*, D.C. After this these two specialists found the maize fungus to be a new *Tilletia*, and described it as *Tilletia epiphylla*, B. and Br." Then Masee, of Kew, afterwards supported this determination, noting that the pustules resembled a rust superficially. If he had only observed the germ-pores of the spore, as shown in the photograph obtained from a type specimen, he would have seen that there was more

than a superficial resemblance, and that it was a rust, and not a smut. Second observations, as well as second thoughts, are not always the best.

I have thus been able to reduce the two species of *Tilletia* given in Cooke's "Handbook" to one, and it is always a greater pleasure to me to reduce the number of species than to increase them, although in an island-continent like Australia, with its varied and unique flora, it is impossible to study this or any of the other great divisions of the fungi without adding considerably to the number of new forms, and, in some cases, as in *Uromycladium* among the rusts, to discover new genera. It is this sense of novelty, this certainty of adding to the sum of human knowledge, which gives a charm and a zest to the study.

NUMBER OF SPECIES—INDIGENOUS AND INTRODUCED.

I am indebted to members of this Club, particularly Mr. C. French, jun., and Mr. Reader, for a number of species as a result of their various collecting trips, also to the Government Botanist for kindly placing at my disposal the valuable specimens in the National Herbarium. Altogether the total number of species recorded for Australia is 68, and I feel certain that a number of species still remain to be discovered, particularly on our native grasses. In Western Australia, for instance, only those species are known which attack cultivated crops, and what a wide field there is for extending our knowledge of what might possibly prove new genera! In Victoria 46 species are known, and only 23 in New South Wales, or exactly half the number, indicating how much we owe to field work in our own State.

In distinguishing between indigenous and introduced species, one has to be guided largely by the host-plants. In the case of the cultivated cereals and some grasses there is historic evidence as to their introduction, and, generally speaking, a species which is found growing wild amid natural surroundings may be regarded as indigenous, while those found amid artificial surroundings, or as escapes from cultivation, may be regarded as introduced. There are, however, exceptions to this. The flag smut of wheat has long been known in Australia, and only recently discovered in India and Japan, and seems to be a native. *Cynodon dactylon* is also a native grass, according to the late Baron von Mueller, and although the smut upon it has been found elsewhere, it may be regarded provisionally as indigenous. According to the principles laid down there are only ten species of smuts which may be safely regarded as having been introduced.

Curiously enough the smut on Australian Couch-grass has only been found in New South Wales and Victoria in one district—in the neighbourhood of Sydney, and at Toorak, near Melbourne. No doubt it is much more widely distributed than this, and members of this Club might assist in settling the extent of its dis-

tribution in Victoria. There is also a species found on various eucalypts in the Botanic Gardens, Amsterdam, forming a woody tumour at the collar, and this, too, has never been recorded for Australia, the home of the eucalypt.

DISTRIBUTION OF THE SMUTS.

This is a branch of the subject in which field naturalists can lend their assistance by forwarding specimens whenever and wherever they come across them. The record is still too imperfect to allow of the smuts being arranged in their geographical districts, and I have simply contented myself with indicating their distribution in the different States of the Commonwealth. There are 9 genera recorded out of a total of about 19 altogether, and the species are distributed in the different States as follows:—Victoria, 46; New South Wales, 23; Queensland, 25; South Australia, 17; Western Australia, 7; Tasmania, 19.

GALL-FORMING SPECIES.

There are only two gall-forming species known—*Melanopsichium austro-americanum*, on a species of *Polygonum* from Queensland, and *Cintractia crus-galli*, occurring on the common Barnyard-grass in New South Wales, and both are adapted for moist situations.

The former is given in Cooke's "Handbook" as *Ustilago emodensis*, but an examination of the original type in Kew Herbarium showed it to be quite distinct from the Queensland specimen. Dr. Treub kindly sent me specimens from Java on *Polygonum chinense*, and they show the clustered outgrowths up to one inch long, forming a swollen head like a *Cantharellus*. The gall-forming species are also interesting on account of their distribution. The Queensland species was first recorded from South America, as the specific name denotes, then it was found in the United States, and now it has been met with near Brisbane.

The smut on the Barnyard-grass is widely distributed in the United States, but has only been found elsewhere near Sydney.

MODES OF INFECTION.

Any paper dealing with the smuts would be incomplete without a reference to the successful measures that have been devised for preventing many of the smuts in our cereal crops, based upon our knowledge of the modes of infection.

It is most important to know how infection occurs in order to prevent it, and this is mainly determined by experiments in the field. If the spores, for instance, are on the grain, and they germinate with it, so that the germ-tube can penetrate the tender seedling, then the evident course is to prevent the germination of the spores by some "steep," such as bluestone. There are at least four principal modes of infection known at the present time—

1. The most common mode is that in which the young seedlings are infected, as in oat smut. (Seedling infection.)

2. Another way is where any young and growing portion of the host-plant is capable of infection, as in the American corn smut, which, however, is not known in Australia. (Local infection.)

3. Infection may also take place through the flower, and the mycelium or spawn of the fungus lies dormant in the ripe grain, as in loose smut of wheat. (Flower infection.)

4. Infection is also known to occur through the young shoots, as in carnation smut. (Shoot infection.)

As an illustration of how the mode of infection is determined, I may take the case of the smut of maize, prevalent in Victoria. It has not hitherto been known how the maize-plant was infected with this smut, and to answer this question, I planted various plots at the Horticultural Gardens, Burnley. The different methods were tested by infecting the seed, the growing plants, and the shoots which sprang up when the plant was cut close to the ground. The result was that the seedling infection produced the smut, and now we are able to recommend methods of treatment.

In conclusion, there are a number of questions suggested by the smuts, such as parasitism and immunity, toxins and antitoxins, and the relations between host and parasite, which it would be out of place to discuss here, but they indicate clearly that the parasitism of the smuts is bound up with the question of parasitism in general. The study of the smuts may therefore throw light upon some of the great scientific problems of the present day, and when they are regarded, not as isolated forms, but as links in the great chain of existence, they may contribute important data towards the establishment of a science of General Pathology. I have recorded and described the smuts known in Australia in this year of grace 1910, and you as field naturalists may extend our knowledge in this direction. One of your former presidents, Mr. Barnard, remarked in his presidential address for 1907:—"In a new country, until your objects have been collected in fairly large numbers, and dealt with from a systematic point of view, it is difficult to see on what lines to investigate the steps in their individual life-histories." I thoroughly endorse that remark, and have simply endeavoured to translate it into practice.

Although the name of smut is often used as a term of reproach and associated with something that is disagreeable and often evil-smelling, I can assure you, after a fairly long acquaintance with them in their various phases, that they exhibit beautiful adaptations to their environment, and that the black masses of spores, when viewed under the microscope, reveal a beauty and a symmetry which would delight the soul of the artist.

Beauty and utility combined is the great quest of our modern civilization, and if you disassociate from your minds the mischief caused by the smuts to our cereal crops, and regard them as organisms which play a very important part in the economy of nature, working out their life-histories so as to survive in the struggle for existence, you will come to the conclusion, with me, that utilitarianism and ugliness are not necessarily associated.

If, as Goethe has said, "the best sign of originality lies in taking up a subject, and then developing it so fully as to make everyone confess that he would hardly have found so much in it," then there is plenty of original work to be done in connection with the fungi of Australia.

CORRESPONDENCE.

VERNACULAR NAMES FOR BIRDS.

To the Editor of the Victorian Naturalist.

SIR,—I notice in the April *Emu*, just to hand, that my near relation, the Western Australian honey-eater described by Mr. North in the January *Naturalist* (*Vict. Nat.*, xxvi., 138), and named by him *Lacustroica whitei*, appears with the vernacular name "the Alfred Honey-eater," though Mr. North had already spoken of it as White's Honey-eater. Surely using surnames should be sufficient compliment in the way of naming species, without resorting to Christian names. The proceeding would not be so questionable if the person commemorated were one who had done good work and deserved recognition, but when it comes to commemorating a boy of seven or eight years of age (*vide* plate ix., *Emu*, January, 1910, page 112), who is said to be "worthily following his father's footsteps" (*vide* Mr. North), well, really, it seems to be making a farce of ornithological nomenclature. I am aware that we already have *Malurus elizabethæ*, and perhaps my next new sister may be *Acanthiza mary-annæ*, "the Mary Ann Tom-tit"; still, I like my own style of name best. When the A.O.U. next revises its vernacular list I hope such examples of toadyism as "the Alfred Honey-eater" will be expunged. Apologizing for the length of my complaint, and trusting it will not be thought frivolous, I am, yours, &c.,

ACANTHIZA NANA.

[Though the appropriate naming of natural history specimens is becoming more difficult every year, owing to the pre-occupation of suitable names, we quite agree with our correspondent that Christian names are undesirable either for specific or vernacular use.—ED. *Vict. Nat.*]

MEMOIRS OF THE NATIONAL MUSEUM, MELBOURNE.—The third number of this publication, dated February, 1910, is devoted to two original joint articles by Prof. Baldwin Spencer, C.M.G., M.A., Hon. Director of the Museum, and Mr. J. A. Kershaw, F.E.S., curator of the zoological collections. The first article, entitled "A Collection of Sub-fossil Bird and Marsupial Remains from King Island, Bass Strait," is illustrated with eight plates. In it the authors describe the results of the investigation of a large number of bones of birds and animals found scattered over an area of sandy country near Stokes Point, the south-western extremity of King Island. When the party from the Field Naturalists' Club visited the island in November, 1887, this area was grass-covered, but later the introduction of sheep resulted in the grass being eaten down to the roots; afterwards pigs rooted into the sandy soil, which then began to blow about, exposing thousands of bones in various stages of preservation. As may be expected, many of these rapidly disappeared on exposure to the air, and, as it was some time before the occurrence of the bones became known in scientific circles, many were doubtless lost before any systematic collection was attempted. The authors, however, have succeeded in piecing together a very interesting account of the extinct fauna of the island. Naturally, the greatest amount of space is devoted to the King Island Emu, *Dromæus minor*, Spencer, about which a considerable amount of uncertainty still exists, but the authors are of opinion that it was a distinct bird from the Tasmanian Emu, unfortunately also extinct, and round which quite as much uncertainty centres. Full measurements are given of a large series of bones, many of which have been reproduced in the accompanying plates. The other extinct species dealt with are *Phascolomys ursinus*, Shaw, the wombat of the Bass Strait islands (still living on Flinders Island) and *Dasyurus bowlingi*. The second article, by the same authors, is entitled "The Existing Species of the Genus *Phascolomys*." About the wombats almost as much uncertainty exists as about the emus, and the authors seem to have so thoroughly exhausted all the sources of information that little will remain for future investigators. The conclusions arrived at are that four species of existing wombats must be recognized, viz.:—1. *Phascolomys ursinus*, Shaw, confined to the islands of Bass Strait, and extinct, so far as known, except on Flinders Island, where it is extremely rare. 2. *P. mitchelli*, Owen, the common species of New South Wales, Victoria, and South Australia. 3. *P. latifrons*, of South Australia and New South Wales (see *Vict. Nat.*, xxvi., p. 118); and 4. *P. tasmaniensis*, sp. n., which has hitherto been regarded as *P. ursinus* of Shaw, but which the authors point out differs in several particulars and is intermediate in size between *P. mitchelli* and *P. ursinus*, the latter being the smallest of the group. Three plates are devoted to

illustrations of skulls and other bones of the different species. Altogether the part forms a valuable addition to the literature of Australian natural history, and is a model of painstaking investigation.

THE EMU.—The April *Emu*, forming the concluding part of vol. ix., contains a well-illustrated article by Mr. F. L. Whitlock, describing a four months' collecting trip in the East Murchison district, Western Australia. It was during this trip that Mr. Whitlock discovered the new honey-eater described by Mr. A. J. North, C.M.Z.S., of the Australian Museum, Sydney, in the January *Naturalist*, and a coloured plate of this bird forms an excellent frontispiece to the part. The drawing is from the brush of Mrs. Ellis Rowan, and has been well reproduced by Patterson, Shugg and Co., and printed in colours by D. W. Paterson Co., of Melbourne. The work is so good that there need be no necessity to send out of the State for future illustrations of a similar character, and we congratulate the A.O.U. on its enterprise. The black and white plates in the part are all fine examples of that style of illustration.

CUCKOO FEEDING YOUNG.—Last Christmas Day, at about 6.45 p.m., I was attracted by a peculiar clattering noise outside my vestry at Smythesdale. I approached the door very silently, and, looking out, observed an adult Pallid Cuckoo on the fence with a large white grub in its bill. The bird was making a peculiar calling noise, and in a few seconds I noticed a young Cuckoo fly up from the ground and perch beside the old bird, which promptly transferred the grub from its own bill to the opened mouth of the youngster. It would appear from this that cuckoos do occasionally feed their young after they leave the nest of the foster-mother.—A. JOHN GREENWOOD.

"NARDOO."—The very meagre reference to Nardoo, in an article by Mr. E. J. Welch in the *Australasian* of 12th February, under the heading of "The Explorer—Dietary Experiences," increased the doubt which already existed in certain quarters as to whether the plant *Marsilea quadrifolia*, Lin., to be found in swampy places near Melbourne, was the true Nardoo plant, the spores of which were reputed to have been used by King, of the Burke and Wills expedition, when stranded at Cooper's Creek in the early sixties. As Mr. Welch was a member of the Howitt relief party, he was communicated with, and distinctly asserts the identity of the *Marsilea* with Nardoo. In his article he states that fish were plentiful at Cooper's Creek, also pigeons, bush-rats, mussels, and "yabbies," but the returned explorers were too weak to secure these different items, and had to be content with Nardoo spores, and "Nardoo alone meant a lingering fight with death." It is to be hoped that the plant produces spores more abundantly in the latitude of Cooper's Creek, for, from experience near Melbourne, to get enough spores to fill a tea cup would appear to be an insuperable task.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE postponed monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 16th May, 1910.

The president, Prof. A. J. Ewart, D.Sc., occupied the chair, and about 80 members and visitors were present.

The President referred in feeling terms to the death of His Majesty King Edward, and said that the postponement of the monthly meeting from the previous week must be regarded as some tribute to his memory. He would have advocated allowing the meeting to lapse altogether but for the fact that it was required to make nominations of office-bearers for election at the annual meeting in June.

REPORTS.

A report of the excursion to Moorooduc on Saturday, 23rd April, was forwarded by the leader, Prof. E. W. Skeats, D.Sc., and was read by Mr. R. W. Armitage. The report stated that there had been a good attendance of members, and an instructive day had been spent. An outcrop of Ordovician rocks near Moorooduc station, yielding graptolites, was first visited; then the granodiorite of Mt. Eliza was examined. The leaf-beds on the coast south of Grice's Creek were pointed out, and a return was made to the fossiliferous limestone and the basaltic outcrops at Grice's Creek, which were examined and discussed. Several interesting species of fossils were met with during the day.

Mr. Barnard remarked that he had noted plants of the fern, *Woodwardia aspera*, at Grice's Creek. From his experience he considered this fern rather rare, and it was interesting to note that its habitat was on the basaltic outcrop.

A report of the junior excursion to the Botanic Gardens on Saturday, 7th May, was given by the leader, Mr. F. Pitcher, who reported an attendance of about forty juniors, who seemed greatly interested in the various features pointed out to them. He was pleased to notice that the majority of those present were wearing the badges.

ELECTION OF MEMBERS.

On a ballot being taken, the following persons were duly elected members of the Club:—Miss H. Deasey, Brighton-road, Elsternwick, Miss J. J. Henderson, St. George's-road, Elsternwick, and Dr. Harvey Sutton, Education Department, Melbourne, as ordinary members; Mrs. H. H. Farmer, Vermont, and Mr. C. M'Lennan National Park, Wilson's Promontory, as country members; Mr. Henry E. Horner, 19 Tintern-avenue, Toorak, and Mr. Wm. G. Spencer, 42 Ferguson-street, Williams-

town, as associate members ; and Miss Emilie Davis, Continuation School, Melbourne, Miss D. Cox, Fitzroy-street, St. Kilda, Miss J. Heatley, Grey-street, St. Kilda, Miss J. Sutherland, 55 Patterson-street, Middle Park ; Master K. Coghill, Canterbury ; Master R. Erck, Gardiner-avenue, Glen Huntly, Master V. Dimelow, 66 Patterson-street, Middle Park, Master N. Fricker, 57 M'Gregor-street, Middle Park, Master C. Glance, 72 High-street, St. Kilda, Master N. Harris, Charnwood-road, St. Kilda, Master B. Lazarus and Master C. Lazarus, 29 Dalgety-street, St. Kilda, and Master F. S. Searle, 942 Lygon-street, Carlton, as junior members.

GENERAL BUSINESS.

Nominations for office-bearers for 1910-11 were received, and Messrs. D. Best and J. Shepherd were elected to audit the accounts of the past year.

Mr. R. W. Armitage mentioned that Prof. Skeats, D.Sc., would commence a series of University Extension lectures early in June, particulars of which would shortly be available.

PAPERS READ.

1. By Mr. R. W. Armitage, entitled "Notes on the Occurrence of Plant Remains in Olivine-Basalt, Clifton Hill Quarry."

The author said that in December last he had been given a piece of wood closely adhering to a piece of Pliocene bluestone (olivine-basalt), found in the corporation quarry at Clifton Hill at a depth of 120 feet from the surface. An inspection of the locality showed that the charred wood was actually enveloped in the basalt, and close examination of the specimen showed that the basalt had even flowed into and filled up shrinkage cracks along the medullary rays and around the annular rings of the wood, making it heavy, and in parts quite solid. He had failed to find a similar specimen recorded for Australia, and references to geological literature failed to show an exactly similar record from any other part of the world.

2. By Mr. A. G. Campbell, entitled "Rambles Round the Grampians."

The author gave a brief description of those portions of the Grampians around Mt. William, Mt. Redman, and Hall's Gap, remarking on the geology, ornithology, and botany of the district. His remarks were well illustrated by a fine series of lantern slides, enlarged photographs, and specimens.

Mr. J. A. Leach, M.Sc., congratulated the author on his fine series of pictures, and remarked on the interesting nature of the Grampian country, which, on account of its geological formation, was very different to anything near Melbourne.

Dr. Sutton remarked on the flora of the Grampians, which possesses many distinctive features, and is well worthy of a visit by lovers of wild-flowers.

NATURAL HISTORY NOTE.

Mr. G. A. Kearthland said that when he mentioned some time

ago that the Striated Grass-Wren of North-West Australia built a nest with a protecting cover, his statement had been questioned, but a photograph of a nest reproduced in the last number of the *Emu* showed that his contention was right.

EXHIBITS.

By Mr. R. W. Armitage.—Photographs in illustration of paper.

By Mr. A. G. Campbell.—Typical specimen of decomposing Grampian sandstone; fossil in Grampian sandstone; felspar porphyry dyke-stone; slate; plutonic rock, and three obsidian buttons, from Stony Creek, Grampians. Four Grampian plants which flower during the winter, viz.:—*Styphelia Sonderi*, *Epacris impressa*, *Correa speciosa* (red variety), and *Acacia retinodes*. All in illustration of paper.

By Mr. A. J. Campbell, Col. Mem. B.O.U.—Seven photographic enlargements of Grampian scenes, in part illustration of Mr. A. G. Campbell's paper.

By Mr. C. French, jun.—Dried plants from Grampians.

By Mr. C. J. Gabriel.—Marine shells: *Meretrix lupanaria*, Lesson, and *M. dione*, L., from Central America; *M. erycina*, L., from Ceylon; and *Lioconcha castrensis*, L., from Philippine Islands.

After the usual conversazione the meeting terminated.

EXCURSION TO MOOROODUC.

MOOROODUC, on the Mornington railway line, about 35 miles from Melbourne, is a convenient centre from which to visit some of the interesting geological formations of the Mornington peninsula, and, favoured by fine weather, on Saturday, 23rd April, the excursion party numbered about fifteen members of the Club and twenty-five geological students from the University.

On arrival at Moorooduc, the attention of the party was drawn to the physiographic features of the district, and especially to the contrast shown by the low-lying rather swampy areas occupied by the Tertiary rocks with the elevated ridge of granitic rocks and older Palæozoic sediments which trends in a north-easterly direction from Mount Eliza. This ridge was ascended at a point about a mile north of Moorooduc station. The hardened and partially recrystallized Palæozoic sandstones and shales were examined. Exposures were limited in extent, but certain of the darker shale bands, although cleared and partially recrystallized, yielded remains of graptolites such as *Didymograptus caduceus*, *Tetragraptus serra*, *Diplograptus*, sp., *Trigonograptus*, sp., &c., and in addition the crustacean, *Rhinopterocaris maccoyi*, was also found. The horizon is clearly Lower Ordovician, and probably Upper Castlemaine or Darriwill. Further south in the Mornington peninsula graptolites of the Bendigo horizon of the Lower Ordovician have been found. The party then travelled to the

south-west, along the crest of the ridge, and examined the features in a quarry excavated in highly altered shales and sandstones adjoining the granitic mass of Mt. Eliza. The sections exposed showed good examples of acid veins from the granodiorite cutting across the sediments, and a number of interesting rock types illustrating the contact metamorphism of arenaceous and argillaceous sediments. Quartzites, hornfels, spotted slates, and andalusite slates were all represented.

The summit of Mt. Eliza (500 feet) was then reached, and rounded outlines of the granitic outcrops were noticed. Study of the rock shows that it belongs to the group of the granodiorites so commonly represented in Victoria. The principal minerals are plagioclase, quartz, orthoclase, and biotite. From Mt. Eliza the party travelled in a westerly direction, and after lunch reached the shore at a point about three-quarters of a mile south of the mouth of Grice's Creek, where olive-coloured and plant-bearing shales of Jurassic age are exposed on the beach in abrupt and probably faulted contact with the decomposed granodiorite of the area. Vegetable fragments were seen in the shales, but no recognizable fossils were found, as the condition of the tide was unfavourable.

Near here a typical aboriginal "kitchen-midden" was seen, consisting of an assemblage of broken shells of the edible molluscs now living in Hobson's Bay. This kitchen-midden, like others to be seen along the bay, occurs on the top of the low cliff, and marks the site of aboriginal feasts.

Further northwards, along the sea-shore, Grice's Creek was reached, and the well-known section in the Tertiary clays and lenticular limestones at this locality was examined. A considerable number of the typical Balcombian fossils was obtained.

The stream section was then examined, and it was noticed that on ascending the stream-course the Tertiary clays were succeeded by decomposed Older Basalt. Apparently the basalt rests upon the clays, but the section was difficult to interpret, as much of this coast-line has suffered from landslip, and one could not be quite sure that the apparent relations of the rocks represented them in their true stratigraphical positions. Higher up the stream the basalt was seen to be replaced by decomposed granodiorite. At this point the organized geological observations ceased, and the members of the party, at varying speeds, made their way to and along the road leading to Frankston, where the party took train to Melbourne.

Further details of the geology of this interesting district, with maps, will be found in a report by Mr. A. E. Kitson, F.G.S., in the "Progress Report of the Mining Department, Victoria," No. 12, March, 1900; and in a paper by myself, contributed to the Royal Society of Victoria in 1907 (Proc. Roy. Soc. Vict., vol. xx. (new series), part 2, page 102).—E. W. SKEATS.

NOTES ON THE OCCURRENCE OF PLANT REMAINS
IN OLIVINE-BASALT, CLIFTON HILL QUARRY.

BY RICHARD W. ARMITAGE.

(Read before the Field Naturalists' Club of Victoria, 16th May, 1910.)

INTRODUCTION.

THE communication I desire to make to the Club this evening has for its object the placing on record of the discovery of plant remains in an igneous rock, with a general description, which may be amplified with greater detail at some later date.

Occurrences such as this are so interesting and rare that I have ventured to gather together references to, and records and descriptions of, similar and allied occurrences in various parts of the world, and to comment on them.

The presence of plant remains in gravels, sand, and silt under flows of volcanic rock, or in beds of clastic material between lava flows of different ages, or imbedded in tuffs, is not altogether uncommon, so that I shall confine the literary references almost solely to records of plant life found actually *in* igneous rocks. Such records are very few in number.

EXTRACTS FROM, AND REFERENCES TO, GEOLOGICAL LITERATURE.

In reference to this subject in general, Dr. Scott (1) writes :—
“It will be readily imagined that lavas very rarely contain fossils. Though the flows often overwhelm living beings, the intense heat at once destroys them, seldom leaving a trace behind, though charred tree-trunks are sometimes recognizably preserved. In tuffs, on the other hand, fossils, especially those of plants, are frequently well preserved, and tuffs formed under water have fossils as abundantly as any other aqueous rocks.”

M. Fouqué (2), describing an effusion of lava from Mt. Etna, writes (trans.) :—“The lava of the eruption of 1865 has flowed amongst a number of high trees ; the ground had opened to a great length at the beginning of the eruption, forming a deep irregular fissure, of which only the most widely opened parts are new craters. Many of the trees had been either destroyed by the great heat or else uprooted. However, many of them still stood on each side of the fissure, although the ground had been violently moved, and although an incandescent current of lava had momentarily surrounded them. The trees thus preserved were all without exception surrounded by a stony casing formed of solidified lava. The inner surface of this casing had been moulded on to the surface of the tree, sometimes representing all the details of the bark with a surprising accuracy. The outer rough irregular surface in every case presented, on the side on which the current had impinged, a prismatic protuberance formed by the lava, of which the tree had arrested the movement. A few of these outer sheaths were intact, but the greater number

had been broken in consequence of the shrinkage undergone, at the instant of cooling, by the material of which they were composed. The fragments of these, often very numerous, lay around the tree which they had before ensheathed. When these layers had become thus broken into fragments, the trunks which they had surrounded, being left bare, had been grooved and scarred by the rough scoriaceous blocks at the surface of the lava, and in the direction of the current and the slope of its surface. It is these casings which I have just described that certainly have shielded the trunks from the effects of the incandescent liquid that flowed all around. The greater number of the trees that have been thus clothed with a protective covering are little changed for the worse. As a rule, the bark only is destroyed. A certain number of them have experienced a commencement of carbonization of the woody part of their stems, but this decomposition is rarely deep, and, by way of compensation, there are some whose bark is so little damaged that certainly they will survive the action of the bath of lava into which they have been plunged."

Mr. Guillemard (3), in describing in 1886 a volcanic crater (Verbrandte Hoek) in North Celebes, to which he had paid a visit, writes :—"It is a cone of ashes of regular shape, whence a small lava stream has issued, carving its way through the forest to the sea. That it is of quite recent date is evident, for the ashes and lava are devoid of all vegetation save a few patches of coarse grass. Visiting it, we found that burnt trees were in many instances still standing in the lava stream, so charred at the base of the trunk that we could easily push them down."

Mr. Dana (4), in his work on volcanoes, writing on volcanic phenomena in the history of the volcano Kilauea, in the Sandwich Islands, states :—"The lava sometimes, as in other eruptions, flowed round stumps of trees ; and, as the tree was gradually consumed, it left a deep cylindrical hole, either empty or filled with charcoal. Toward the margin of the stream these stump-holes were innumerable ; and in many instances the fallen top lay near by, dead but not burned. . . . The rapidity with which lava cools is still more remarkably shown in the fact that it was found sometimes hanging in stalactites from the branches of trees ; and, although so fluid when thrown off from the stream as to clasp the branch, the heat had barely scorched the bark."

In another part of the book he says :—"Half-charred trunks were standing, in 1887, with a rough cylindrical encasement of lava about the stumps, projecting from two to two and a half feet or more above the level of the solidified stream." In the book is given a wood-cut of this phenomenon.

Mr. Shaler (5), in a paper written in 1891, includes a plate which gives a representation of the "margin of a lava stream overflowing a soil occupied by vegetation."

In connection with a peculiar quartz-basalt lava flow, which is thought to have occurred about one hundred years before the American Revolution, near Volcanic Ridge, which connects the northern end of the Sierra Nevada in California with the Coast Range, Mr. Diller (6) writes :—" Plate xiv. shows the upper portions of a tree projecting from beneath the lava. The top has been broken off and lies upon the ground. The tree was pushed over by the advancing lava, and apparently belongs to those killed at the first eruption when the Cinder Cone was formed. . . . As the stumps of the trees killed at the time of the earliest eruption decay, the sand caves in to take the place of the wood and forms a pit, as illustrated in the figure. These pits, often three feet deep, are numerous near the base of the Cinder Cone, and may be observed at least to the south-west for a distance of one and a half miles from the cone."

This last description coincides to some extent with that of the Kilauea eruption, as well as with the descriptions of the 1865 Etna eruption and that in North Celebes. In all of these cases, which are geologically very recent, it is most probable that the plant remains referred to will become unrecognizable as such before the lapse of any great geological time.

Mr. Seward (7), speaking of plant remains associated with the action of volcanoes in Upper Palæozoic times, says :—" It is well known to geologists that during the Permian and Carboniferous periods the southern portion of Scotland was a scene of widespread volcanic activity. Forests were overwhelmed by lava streams or showers of ash, and, in some districts, tree-stems and broken plant fragments became sealed up in a volcanic matrix." . . . " On the coast near Burntisland, on the Firth of Forth, blocks of rock are met with in which numerous plant fragments of Carboniferous age are scattered in a confused mass through a calcareous volcanic matrix. The twigs, leaves, spores, and other portions, are in small fragments, and their delicate cells are often preserved in wonderful perfection." It will be noted that Mr. Seward makes no mention of plants being found actually sealed up in an igneous rock, his references being rather to plant remains found under lavas or in pyroclastic tuffs.

In 1819, Dr. Macculloch (8), in portion of his description of the geology of the island of Mull, wrote :—" The last substance which it is necessary to notice as occurring in this trap, is carbonized wood. This substance is contained in a perpendicular vein, about fifty feet in height, and five feet in breadth . . . the upper (end) terminating abruptly in the mixture of solid and columnar basalt by which it is everywhere surrounded. The upper part of this vein is a conglomerate of soft grey trap fragments imbedded in a paste of the same material. Toward the bottom it varies and becomes mixed with a black substance, which on examination is found to consist of minute fragments and a fine powder of car-

bonized wood, the vegetable organization being still visible in the former. Amongst this black matter a portion of the trunk of a tree appears, in a direction parallel to the side of the vein, and therefore erect, being entire and unbroken for the space of at least six feet. On careful examination of this wood it appears to be fir, which at least it perfectly resembles in its anatomical structure. . . . I believe that in all the instances hitherto described, the wood has, as in the present case, been found in a conglomerate or in some other rock, either lying under, or entangled in the basalt, and not in the basalt itself."

This description is further illustrated by a plate showing the position of the carbonized wood in the conglomerate.

In a paper by Mr. Cadell (9), printed in 1892, is recorded the discovery of a fossil in basalt at Bo'ness Coalfield, Linlithgowshire, Scotland. He speaks of "the specimen, which is preserved in greenstone." . . . "The fossil is part of a Lycopod stem." . . . "With the exception of (a) very thin coating of iron oxide, and perhaps a little carbonaceous matter mixed with it, the original plant in its upper part is entirely replaced by crystalline calcite." . . . "The great interest of the specimen centres in the matrix in which it is preserved. The occurrence of a plant preserved in basalt is perhaps unique."

Mr. Walcott (10) described, in 1899, an occurrence discovered in a basalt quarry at Footscray, which is about four miles west of Melbourne. This was a tree that had been pseudomorphously replaced by basalt. He says:—"The original body (of the tree trunk) had first been entirely removed, leaving a cavity or mould which has been subsequently filled by a molten mass of lava. The cast retains the external appearance of a tree, but is quite devoid of all other similarity." This specimen may be seen in the Mineralogical Section of the National Museum, Melbourne. In both this occurrence and that described by Mr. Cadell, pseudomorphs, in the one case, of basalt, and in the other, of calcite, exist in the place of the original material of which the plants consisted, such original material having quite disappeared.

In connection with a discovery of fossil wood under the famous Sgurr (or Scur) of Eigg, one of the islands of the Inner Hebrides of Scotland, much controversy has arisen as to the nature of the actual matrix in which the fossil plant remains were found. Some writers seem to think that all of the fossil wood occurs in a breccia or conglomerate under the pitchstone of which the Sgurr is composed; while others aver that, although the greater part of the wood occurs in that situation, yet some at least is to be found actually in the decayed base of the pitchstone. The statements of two or three of those who have written on the subject may be quoted.

Mr. Hugh Miller (11), in 1858, thought the pitchstone represented a volcanic flow that overspread beds of Oolitic grits resting

on the underlying basalts. In describing the fossil wood, he says :—"Some of the upper pieces (of the Eigg pine) we found in contact with the decomposing trap . . . ; but the greater number . . . lay imbedded in the original Oolitic grit in which they had been locked up."

Sir Archibald Geikie (12), in 1871, regarded the pitchstone of the Sgurr as a succession of lava flows which covered up the eroded surface of older basaltic outpourings.

In 1865 he (13) had said :—"At either end of the long ridge, this pitchstone is seen to lie upon a hollow eroded out of the underlying level sheets of basalt and filled up with compacted shingle. Among the rounded stones of this shingle-bed there is an abundance of coniferous wood, in chips and broken branches, yet so well preserved that, when newly taken out and still damp, it might be taken, but for its weight, for the relics of some old pine forest buried in a peat-bog."

Sir Archibald Geikie, then, believed the fossil pine-wood fragments to be enclosed in what he regarded as a river-conglomerate underlying the pitchstone of the Sgurr.

He says in a note (12) that "the actual position of the wood, however, in the breccia and conglomerates underlying the pitchstone is beyond all dispute. I myself have dug it out of the bed."

Mr. Alfred Harker (14), in a paper recently written, does not at all agree with Sir Archibald Geikie's interpretation of the matter. He goes into the subject very fully, and, if his views are correct, the process whereby the fossil wood arrived at its present position is the result of such an interesting series of events that they are well worth being reviewed.

He regards the pitchstone that composes the Sgurr as intrusive into the group of basalt flows underlying the breccia containing the plant remains, while the breccia itself he considers a volcanic agglomerate partly re-arranged by water action. This agglomerate "consists chiefly of fragments of various sizes, with a smaller proportion of matrix, which is not always of the same nature. Sandy or basaltic (perhaps ashy) material may predominate, and there may or may not be sufficient calcareous and ferruginous matter to make a binding cement. The fragments are of red sandstone and other Torridonian (Pre-cambrian) rocks and of (Tertiary) basalt, the relative proportions of these two varying, though the former element is always well represented. There are angular blocks of Torridonian sandstone up to four feet in diameter, besides smaller fragments. Some of the pieces of basalt measure from one to two feet in diameter, and they are mostly sub-angular in shape. Of more local distribution in a recognizable state is the soft Oolitic sandstone. Pieces of this are abundant in places, generally in a crumbling condition, and the sandy element in the matrix may be attributed to this source. Mingled with the fragments of Oolitic sandstone are fragments of brown wood."

Mr. Harker regards this agglomerate as having consolidated from material ejected from a Tertiary volcano, and containing in it, among other material, derivative fossil wood brought up by volcanic action from Oolitic strata beneath the basalts. Across these basalts and agglomerate has subsequently been intruded a hypabyssal pitchstone complex, which, as it passed the agglomerate band containing the fossil wood, had taken up a log and smaller pieces and included them in itself. He further states:—"In the lower part of the pale decomposed pitchstone, but distinctly enclosed in it, occurs the main mass of the wood which has furnished the specimens of *Pinites eiggenensis*. There can be no doubt that this (as well as the Torridonian fragments) has been taken up from the underlying breccia. Most of the wood both in the main mass and in the scattered pieces is completely silicified, of a lustrous black, and often shot through with slender threads of white calcite; but there is some which is not silicified, being more or less carbonized, with a similar black, lustrous aspect."

About eight feet of this wood was exposed as a log with a flattened oval outline in transverse section about eight inches in vertical height. Smaller pieces were found near this log. As well as these pieces in the pitchstone, those in the agglomerate beneath are described.

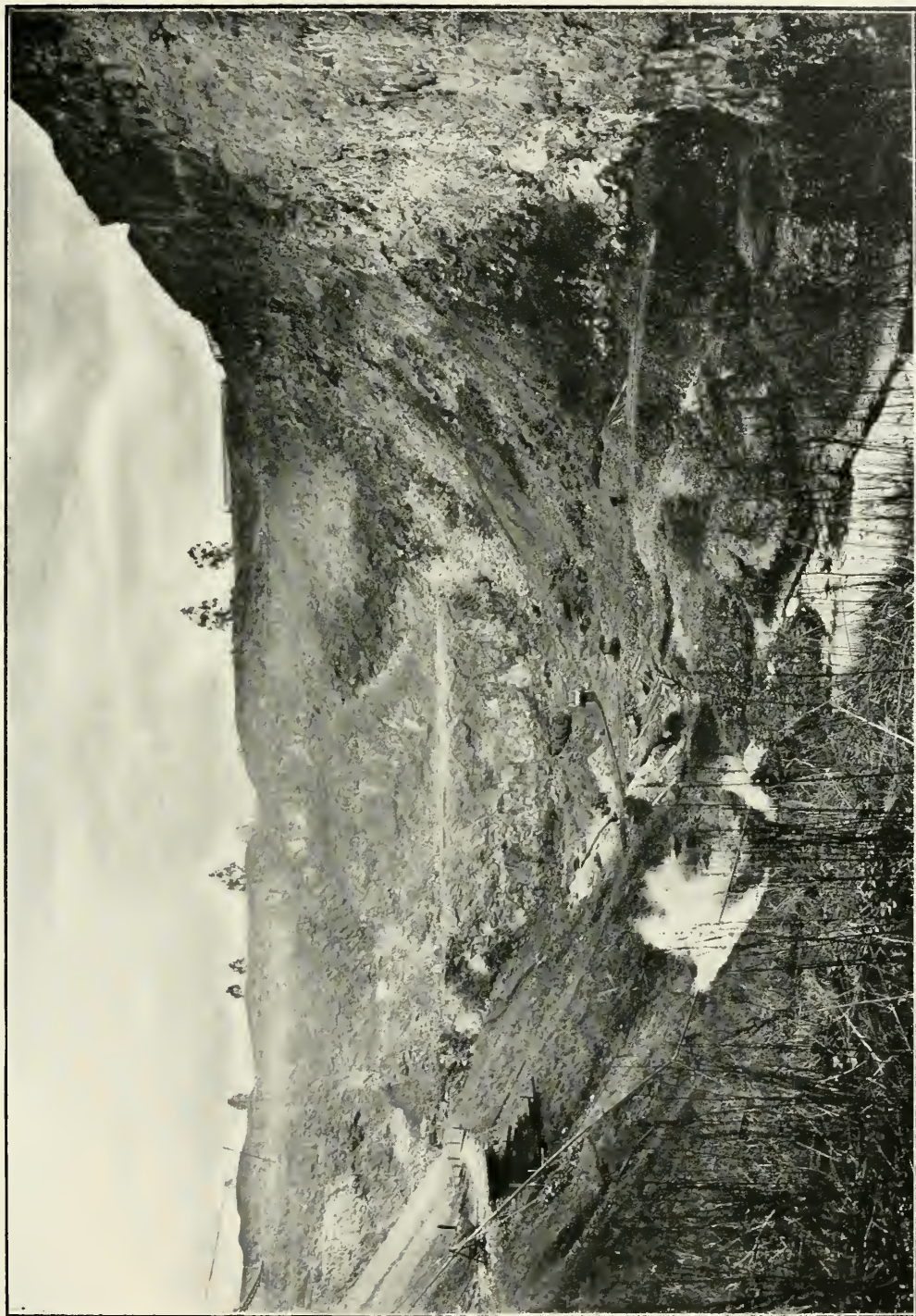
Dr. Solórzano and Mr. Hobson (15) recently described a specimen which is to be seen in the museum of the College of St. Nicholas (founded in 1540), in the city of Morelia, Mexico.

Dr. Solórzano writes (trans.):—"I will mention another volcanic product which . . . is exceedingly interesting, since it proves not only the small conductivity of lavas in spite of their very high temperature, but also indicates, to a certain extent, the epoch in which volcanic phenomena were in full activity in the region where the rock I refer to was collected. . . . It is a basaltic scoria which shows numerous and very distinct external impressions of female ears of maize and also entire grains and carbonized remains of the axis of the ear. This seems to show that the inhabitants of the locality in question cultivated the plant just mentioned when a volcano (one of the extinct ones which exist between Quiroga and Patzcuara) made the eruption which ejected the rock above described."

Summing up the above references, we find records as follows:—

- (a) Fouqué, Guillemard, Dana, Diller, and Solórzano and Hobson—Plant remains preserved during historical times in lavas of various kinds.
- (b) Macculloch—Carbonized wood in Tertiary trap conglomerate.
- (c) Cadell, and Walcott—Pseudomorphous replacements of plant remains in Tertiary basalt.
- (d) Harker—Derivative Oolitic fossil silicified wood in Tertiary hypabyssal pitchstone.

PLATE III.



VIEW OF CLIFTON HILL QUARRY.

Photo. by J. A. ARMITAGE.

PLATE IV.

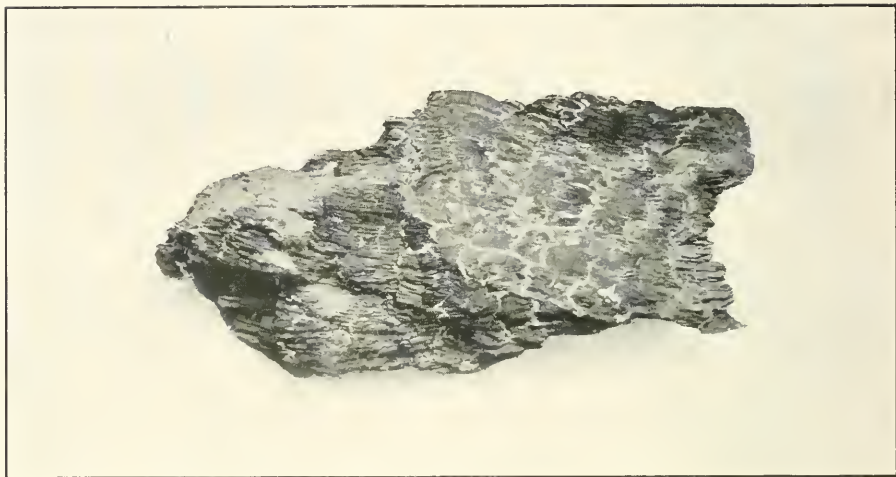


FIG. 1.



FIG. 2.

PORTIONS OF THE FOSSIL WOOD.

Photos. by J. A. ARMITAGE.

To these I am now enabled to add—Carbonized wood in Newer Pliocene basalt.

DESCRIPTION OF THE OCCURRENCE OF THE PLANT REMAINS.

In December, 1909, a specimen of charred wood closely adhering to a piece of bluestone was brought to me by Master Henry Baker, a lad in my geology class at the Melbourne Continuation School. He stated that it had been handed to him by his father, who is a workman employed at the Melbourne Corporation Quarry, Clifton Hill. From this quarry, which is about three miles north-east of Melbourne, a large amount of bluestone, an olivine-basalt, is procured for street-making purposes. It is also famous for the numerous beautiful secondary crystallized minerals that have been procured at various times from it.

I thought the specimen given to me so unique that I went out to the quarry, and Mr. Peter Tait, the manager, kindly allowed the workman, Mr. J. Davies, who had broken open the basalt containing the plant remains, to indicate to me the spot where the specimen had been procured. It was on the north side of the quarry in the lower part of the lowest flow and about 120 feet from the surface of the uppermost and most recent flow. The basalt in the immediate vicinity of that in which the specimen was imprisoned is of a light-greyish-blue colour and very tough and dense, except in parts right at the base of the flow, where its structure becomes ropy and scoriaceous. Slices examined under the microscope show it to be a fine-grained rock, consisting of granular aggregates of olivine with many phenocrysts of the same mineral, which include small grains of magnetite and ilmenite; lath-shaped crystals and microlites of a plagioclase feldspar, probably andesine, are fluidally arranged and ophitically included in a matrix of pale brown augite, which, with small grains of olivine, augite, magnetite, and ilmenite, constitutes the ground mass of the rock.

The following is an analysis (16) of a sample of Melbourne basalt :—

SiO ₂	...	...	...	...	49.95
Al ₂ O ₃	...	...	...	...	18.51
Fe ₂ O ₃	...	...	...	...	6.42
FeO	...	...	...	...	5.18
MgO	...	...	...	...	6.36
CaO	...	...	...	...	8.80
Na ₂ O	...	...	...	...	3.25
K ₂ O	...	...	...	...	0.68
H ₂ O+	...	...	...	...	0.70
CO ₂	...	...	...	...	0.15
Total					100.00

From examination petrologically and from chemical analysis the rock proves to be an olivine-basalt.

I procured all of the remaining portions of the specimen that were available, but many pieces had been broken up along with the surrounding basalt by the workmen and sent to the stone-crushing machines. Logs of wood pyritized and partly carbonized have not infrequently been uncovered from the ancient river sands which underlie the basalt in this and other quarries about Melbourne. In at least one case (17) the genus and species of the plant have been determined. A piece of basalt enclosed in a gnarled stump was also obtained on this occasion.

But the occurrence described in the present communication is, as far as I have been able to ascertain, the only recorded instance in Australia of plant remains being found actually in an igneous rock. The pieces of which I am possessed were necessarily broken in the operation of quarrying, but enough of them remain to show that the charred wood is so closely clasped in its stony covering that it looks as if the basalt had been ingeniously grafted on to the wood. Not only is the contact between the two remarkably close, but the basalt has, in fact, even flowed into and filled up shrinkage cracks along the medullary rays and around the annual rings of the wood, making it heavy, and in parts quite solid. It is, as it were, filled with miniature dykes and sills of basalt. The piece of wood when complete must have measured at least three feet in length and seven to nine inches in diameter. It has the appearance of a charred piece of one of the *Casuarinæ*, but further microscopic examination is necessary before it can be definitely decided that it is so.

Such examination of slices to be made later will doubtless reveal other interesting features worthy of remark. As to the method by which the wood became imprisoned in its stony sheathing, it is not very difficult to realize that, as the lava, which must necessarily have been extremely liquid, flowed and rolled along the ancient Pliocene valley, it caught up and enveloped the wood. The great heat drove off and caused the oxidation of the hydrocarbons; but before the carbon could become oxidized the air supply was shut off by the molten lava surrounding, and penetrating the shrinkage cracks of, the carbonized remains. These were thus sealed up until revealed, having suffered no further change than a slight pyritization.

The age of these Yarra Valley basalts has been discussed by Mr. A. E. Kitson (18), who has come to the conclusion that they are Newer Pliocene. The fossil wood described herein would not come in the category marked (a) in the summary of references on p. 26, which refer to occurrences of very recent geological time, but would be placed with those marked (c) and (d). At the last January meeting of the Club a piece of the wood enclosed in the basalt was shown (19), and at the March meeting a microscopic rock slice, showing the junction of the wood and basalt, was exhibited (20).

EXPLANATION OF PLATES.

Plate III.—General view of the quarry, looking west. The plant remains were found in the base of the basalt wall to the right of the picture.

Plate IV.—Fig. 1. Portion of the fossil wood. The white and grey streaks and lines show the miniature dykes and sills of basalt in the wood. $\times \frac{1}{4}$.

Fig. 2. Portion of the plant remains which are seen adhering closely to the basalt. The grey and white marks show where the basalt has invaded the shrinkage cracks of the wood. $\times \frac{1}{4}$.

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THE UTRICULARIAS.—P. von Huetzelburg, in *Flora*, c. (1909), p. 145, gives the results of a study of various species of Utricularia, and comes to the conclusion that they are truly insectivorous, being able to digest the insects which they catch owing to the secretion of an enzyme and an acid. The hairs which entrap the insects secrete sugar and mucus, but have no digestive action. The bladders are all of similar structure, and the flap closes so tightly, owing to the mucus present, that no insects can possibly get out.

SANCTUARIES FOR SEA-BIRDS.—By a recent *Gazette* notice the Tasmanian Government has proclaimed Foster and Albatross Islands as sanctuaries for sea-birds. The former is situated in Banks Strait, off the north-east coast of Tasmania, and is the resort of Pelicans and Cape Barren Geese; while Albatross Island, off the north-west corner of Tasmania, is the breeding place of the Sooty Albatross and other birds. Cat and Storehouse Islands, portion of the Flinders Group, on which there are extensive rookeries of gulls, gannets, penguins, and mutton-birds have also been reserved, so that our sea-birds should now receive some measure of protection, and naturalists should be deeply indebted to the Tasmanian Government for its action.

DISTRIBUTION OF ROTIFERA.—Mr. C. F. Rousselet, in the *Journal of the Queckett Microscopical Club* (1909), p. 465, discusses the results of recent investigations with regard to the geographical distribution of Rotifera, and arrives at the conclusion that most of these creatures enjoy an almost cosmopolitan range all over the world, and that it is not possible to speak of any typical or peculiar Rotatorian fauna for any continent, zone, or region. Numerous examples are given of rare species appearing in widely separated localities, indicating that distance is no obstacle to their distribution, provided only that suitable conditions are encountered. The fact that certain Rotifera can come to life again after prolonged desiccation cannot account for their wide range, and he considers the main cause of their cosmopolitan distribution is to be attributed to the dispersal of the resting eggs, which are able to resist desiccation and low temperatures, by means of wind and other agencies, to any distance.

RAMBLES ROUND THE GRAMPIANS.

BY A. G. CAMPBELL.

(Read before the Field Naturalists' Club of Victoria, 16th May, 1910.)

It was in the month of July, 1836, that Major Thomas Mitchell, overlanding from Sydney to what is now Portland, while crossing the plains of north-western Victoria, afterwards called the Loddon and Wimmera districts, came in sight of a range of mountains rising abruptly on the south-western horizon. He promptly decided to make a detour towards them, and, attracted by a fancied resemblance to the mountains of the same name in his native land, named them the Grampians, and the highest peak Mt. William, after the then reigning king of Great Britain. He spent two days in exploring around this peak, from which he obtained magnificent views of the surrounding country, and included among the botanical specimens which he collected there were the types of *Eucalyptus alpina*, *Pultencea mollis*, and *Grevillea aquifolium*, all named by Lindley.

These mountain fastnesses were not, so far as is known, again invaded until the spring of 1853 (*Vict. Nat.*, xxi., p. 19), when that intrepid botanical explorer, Dr. F. (afterwards Baron von) Mueller, starting at Mount Sturgeon, reaped a harvest of new and characteristic plants from their rocky slopes. Some account of the botany of Mt. Sturgeon will be found in an early *Naturalist* (*Vict. Nat.*, iv., p. 12, May, 1889).

To-day the mountains are more accessible. Travellers on the Melbourne-Adelaide railway, when in the vicinity of Stawell, looking to the westward can see these bold, serried peaks rising prominently from their otherwise flat and uniform surroundings. Especially is this the case on the branch line from Ararat to Hamilton, where, for a distance of nearly fifty miles, the train runs parallel to and at no great distance from the Serra Range, well named from its numerous saw-toothed peaks.

The general shape of the Grampians is that of a giant boomerang, Mount William, 3,830 feet, the culminating point, being on the angle; the northern extremity, Mt. Zero, being 32 miles distant, while Mt. Sturgeon is about 28 miles south-westerly. Behind the Serra Range lies the almost parallel Victoria Range, and further west is the valley of the Glenelg, with the Black Range beyond.

Mount William is interesting in another way. It marks the watershed of the rivers flowing north to the Murray, and those flowing south to the Southern Ocean; thus the sources of the Little Wimmera are not far separated from those of the Wannon and the Hopkins.

In 1901 the mountain was the centre of a gold rush, the precious metal being found associated with granitic outcrops over a somewhat limited area. The mass of the Grampians

consists of a firm but rather coarse sandstone, and is classed stratigraphically as of Devonian age. Fossils are exceedingly scarce, in all probability on account of the coarse nature of the stone, but it has been my good fortune to discover four or five specimens, now in the National Museum, which are thought to be fossil worm-castings.

At two localities, to my knowledge, does the sandstone show alteration—viz., in the Mt. William and Stony Creeks. In both places the granitic rock appears in the floor of the valleys, and contains gold. The most interesting feature, however, in these gold-bearing dirt is that numbers of obsidian buttons have been found in them. This may be new information to many geologists, but many specimens of typical size and shape have been washed out by the miners at elevations of from 2,000 to 3,000 feet above sea level. One exceptionally fine button, over two inches in diameter, is in the local museum at Ararat. Porphyritic dykes are also to be seen outcropping in the Stony Creek valley.

The predominant and characteristic feature of the Grampian sandstones is their low angle of dip. Over large areas the dip of the beds is fairly regular and constant, being about 30° in a westerly direction. I have not taken accurate observations, and these figures are mentioned only to emphasize the fact that the resultant scenery and the configuration of the country is greatly due to the uniform dip. Thus the characteristic form of many of the peaks, as shown in the photographs exhibited and the lantern slides, is due to the low angle of dip. The country weathers into a series of sharp-pointed peaks, having a long slope on one side along the line of dip, and a steep escarpment on the other, where the sandstone beds break off abruptly.

The Grampian scenery is unique, for not only are the mountains a striking mass in relation to surrounding flatness of the Tertiary plains, but within themselves they have a character all their own. The rock scenery is of the finest description, in which the varied colours of the stone play an important part. Nature's universal pigment, iron, has tinted the rock faces in all shades of red and brown.

At one point only, Hall's Gap, are there facilities for tourists, and this is sixteen miles from a railway station, Stawell. It is central, and with some grand scenery within a day's outing. It was here the excursion party from this Club made its first acquaintance with the mountains, in November, 1891 (*Vict. Nat.*, viii., p. 181), but the members were unfortunate in having a very dry season for their excursion. Many of the wilder and more rugged portions of the Grampians are at present almost out of reach. The only other settlement is Pomonal, on the eastern slope of the range, to the south of Hall's Gap. This place is making great strides, and is fast becoming one of the first apple-growing districts in the State. It is but little heard of, however,

in Mebourne, as the produce goes almost entirely to European markets.

In its flora the Grampians can boast of many species which are peculiar to its sandstone hills. Two of these, both myrtaceous plants—*Thryptomene Mitchelliana*, F. v. M., and *Calycotrix Sullivani*, F. v. M.—are specially worthy of mention, the former, as its name indicates, being named after the first visitor to the mountains, while the latter was named after the late Mr. D. Sullivan, of Moyston (*Vict. Nat.*, xii., p. 36), who did much to elucidate the botany, and published a census of the Grampian plants in the "Proceedings of the Australasian Association for the Advancement of Science," Melbourne meeting, 1890. The native heath, *Epacris impressa*, is finer nowhere in the State, while its flowering season, April to October, is a particularly long one. A singular little plant is *Candollea sobolifera*, F. v. M., which, though generally found on the mountain tops, also creeps down the slopes to about 1,000 feet above sea-level.

As might be expected, there are about the mountains multitudinous sites each with its own peculiar quota of plant life, giving expression to the surrounding conditions. Thus there is the exposed northern aspect with the gums, *Eucalyptus capitella*, Smith, "Peppermint Stringybark," and *E. obliqua*, L'H., "Messmate," growing among the stones, with the Grass-tree, *Xanthorrhœa australis*, R. Br., and *Brachyloma daphnoides*, Benth., a representative of the Epacridæ. Then the sandy foot-slope, sweeping towards the east, and favoured by the orchardists, was naturally clothed with *Eucalyptus stuartiana* and a great variety of small shrubs and undergrowth. There is the wet pocket, where the King Fern, *Osmunda barbara*, Thunb., and the Blackwood, *Acacia melanoxylon*, R. Br., hold sway, and there is the occasional gully where fine specimens of the tree-ferns, *Alsophila australis*, R. Br., and *Dicksonia billardiera*, F. v. M., may be seen. High up in the mountains the cliff faces are veritable rock-gardens of Epacrids and Grevilleas, with the pine, *Callitris verrucosa*, R. Br., adding variety to the scene. Higher still, where the snow lies in winter, the Alpine Gum, *Eucalyptus alpina*, Lindley, *Banksia integrifolia*, L., *Melaleuca decussata*, R. Br., and *Leptospermum lanigerum*, Smith, var. *grandiflorum*, hold sway. I have identified some 450 species of plants around Pomonal.

Bird life is, to some extent, disappointing. There are neither the numbers nor the variety one would expect in an area so remarkable in other respects. The Emu is found throughout, but generally of a smaller and darker nature than the normal bird. This season I discovered, for the first time, the Flame-breasted Robin, *Petroeca phoenicea*, nesting in the mountains above the 2,000 feet level. Perhaps the most noticeable bird is the Black Magpie, *Strepera graculina*, which comes down in the

mornings in rowdy companies of fifty or sixty to feed on the Cranberries, *Styphelia humifusa*, and on the insect life of the orchards, and makes off back in the evening, calling and chattering the whole time. A list of the birds observed at the State School, Pomonal, on last Bird Day, 29th October, 1909, and recorded in the *Emu* for January last (*Emu*, vol. ix., p. 169), will be found of interest when interpreted according to the style of country the several birds inhabit. One may read into such a list all the conditions obtaining, or throwing influence upon the district. Thus the presence of the Magpie, Laughing Jackass, and Ground-Lark indicate that the country is being opened up, as these birds increase with settlement; while the Black Cockatoo and Crimson Parrakeet point to the immediate vicinity of wild and secluded mountain ranges. The Grey Crow-Shrike, White-throated Tree-creeper, Scarlet-breasted Robin, Grey Thrush, Brown Flycatcher, and White-shafted Honey-eater belong to quiet forests, as do the Striated and Brown Tits and Scrub-Wren. The Ground-Thrush, Yellow-breasted Robin, White-throated Thickhead, Yellow-faced Honey-eater, and White-shafted Fantail inhabit thickets and such cover as deep and undisturbed gullies afford, while the Tawny-crowned Honey-eater indicates the presence of heath and short scrub. The White-winged Chough, the Bell-bird (*Oreoica*), and the Red-capped Robin show that the locality is near enough to the box-tree and red gum flats of the Wimmera to admit of occasional visits from typical local representatives of that warmer area.

Mount Redman is about two miles north and 670 feet lower than its neighbour, Mount William, being 3,160 ft. above sea level. Its sharp contour bears a remarkable likeness to a man's face, and is in great contrast to the more bulky rounded dome of Mt. William. From a geological point of view it is perhaps the more interesting of the two, being a typical example of a Grampian sandstone peak. Its face escarpments are very fine, both in colour and form. Some of the cliffs are fully 500 feet in height. Here and there the rocky battlements are splashed with white, marking the spot where some owls have found a nesting hole, or perchance an eagle or falcon has its eerie. The back slopes are even in grade, and make a striking picture. Perched rocks are common. Other portions weather into curious and fantastic shapes. Some are like oysters or turtles in shape; others are like cheeses or armadillos.

Watercourses commence high up on the slopes and gradually deepen until they become veritable canyons, rugged and rock-ribbed. The clefts are so moist and shaded that the ferns *Polypodium punctatum* and *Aspidium capense*, also the filmy fern, *Hymenophyllum nitens*, grow and flourish in them. These plants have not, I think, been previously recorded for this part of the State. Of orchids there is a great variety, and I have seen

the South Australian species, *Thelymitra fusco-lutea* and *Calenia filamentosa*, thriving among our own common species. *Caleya major* and *C. minor* were recorded many years ago as great rarities, and might appropriately be named the "flying-duck orchids."

The landscape to be obtained from any of the prominent peaks is not the least interesting feature of the mountains. A vast area of Western Victoria lies stretched out before one like a giant relief map. To the south from Mt. William lies portion of the famous Western District—basaltic plains stretching to the sea-coast, broken here and there by dead volcanic cones. At this time of the year large rectangles of turned-up red soil ready for sowing indicate the rapid extension of wheat-growing. Eastward lie the bold outlines of the Pyrenees and the adjacent ranges, the western limit of the Ordovician gold-bearing rocks of Victoria. To the north is the long, unbroken horizon of the Wimmera Plains, stretching away into the Mallee and on to the Murray, whilst to the west lies a mass of broken sandstone ridges. Range after range, five of them rear their rugged crests, duplicates in formation of that on which we stand. They are seldom trodden by man, and are unbroken by settlement of any kind. They have nothing to barter away to the mercenary spirit of to-day in gold or produce of any sort—nothing but fresh air and wild flowers, and rocky steepes that challenge every step of the new-comer's foot and every air-sac in his lungs.

Long may their native grandeur lie unspoiled. Their function to the surrounding country is to be a gathering ground for the water required by the Wartook Reservoir and Lake Lonsdale to fit them for the part they are designed to play in supplying the needful moisture to the thirsty soil of the northern plains.

To those city folk who desire an entire change of scene the Grampians offer splendid opportunities, while, as I have briefly indicated, to the naturalist, and especially to the botanist, they afford unlimited scope for exploration.

[The paper was illustrated by a fine series of some 70 lantern slides.—ED. *Vict. Nat.*]

WILSON'S PROMONTORY NATIONAL PARK.—The committee of management desires to obtain living native animals and birds for introduction into the National Park. Kangaroos, rock wallabies, and wombats, with the smaller marsupials, such as flying opossums, rat kangaroos, bandicoots, and pouched mice, are particularly desired. Among birds, emus, lyre-birds, bower-birds, mallee-hens, &c., are desired. Further particulars can be obtained from the secretary of the park, Mr. J. A. Kershaw, National Museum, Melbourne.

BOOK NOTICE.

THE SMUTS OF AUSTRALIA: their Structure, Life History, Treatment, and Classification. By D. McAlpine, Government Vegetable Pathologist, Department of Agriculture, Victoria. 1910. 285 pp., with 57 plates, including 312 illustrations. 4s. Melbourne: J. Kemp, Government Printer.

Students of economic botany all over the world will owe a debt of gratitude to Mr. McAlpine for his new work, "The Smuts of Australia." His previous volume on the "Rusts" has received high praise in all quarters, and we have no doubt but that the present work will receive a similar reception. As pointed out in the preface, "careful cultivation, suitable rotation, and judicious manuring" can be carried out, and so cause an increase in the yield of cereal crops, but were the crops protected from the ravages of preventable diseases the increase would be much greater. The number of fungi classed as smuts is not large, but as they principally attack our cereal and fodder crops the result to the community may be very serious, hence the value of Mr. McAlpine's observations. He has divided his work into sections. The first is devoted to the general characters of smuts; the second to the life histories of the cereal smuts, fully illustrated by natural size drawings, and the approved treatment. The smuts attacking grasses and fodder plants are then dealt with in the same way, and the results of field experiments carried out last year are given at length. The fifth and concluding section contains the classification and descriptions of the sixty-eight species recorded for Australia. This portion of the work shows an immense amount of research, and will save the student much valuable time when working at the group, for the author has dealt with each species so minutely as to references, synonyms, descriptions, mode of occurrence, &c., as to leave little for future investigators to do, while nearly every species has its plate, including several figures of the spores, &c. The majority of the illustrations are from photographs by Mr. G. H. Robinson, the author's former assistant, and have been well reproduced in black and white at the Government Printing Office. An explanation of terms, list of literature, host index, fungus index, and general index complete the work, which, like its predecessor, will doubtless become a text-book in Agricultural Colleges in various parts of the world.

UNIVERSITY EXTENSION LECTURES.—Prof. E. W. Skeats, D.Sc., will commence a course of lectures, entitled "Some Problems in Physical Geology," at the Geology School, University, on Tuesday evening, 14th June, at 8 p.m. Eighteen lectures will be delivered. Tickets admitting to the course are obtainable at one guinea each. Further particulars may be obtained from the hon. sec., Mr. R. W. Armitage, Continuation School, Melbourne.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE thirtieth annual meeting was held at the Royal Society's Hall on Monday evening, 13th June, 1910.

The president, Prof. A. J. Ewart, D.Sc., occupied the chair, and about 60 members and visitors were present.

REPORTS.

A report of the excursion to West Essendon on Saturday, 14th May, was given by the leader, Mr. R. W. Armitage, who reported a good attendance of members and a very interesting afternoon. The party visited the Saltwater River at the Horseshoe Bend, and discussed the geology and physiography of the district. The immense depth of bedded sands of various colours, which are being utilized for building construction, &c., was quite a revelation to the members.

A report of the excursion to Royal Park on Saturday, 28th May, in the absence of the leader, Mr. G. B. Pritchard, F.G.S., was given by the hon. secretary, who reported a good attendance of members. He said that Mr. Pritchard had carefully pointed out and explained the different formations—Tertiary, Basaltic, and Silurian—met with in the railway cutting near Flemington Bridge, in which is exhibited, in a few hundred yards, perhaps the most interesting series of beds to be found near Melbourne. Casts of several species of fossils were collected by the members.

A report of the excursion to Toorak and Richmond Park on Saturday, 11th June, was given by the leader, Mr. J. S. Kitson, who reported a fair attendance of members. The features of the Gardiner's Creek valley had been pointed out, and the reasons for the "death" of the stream explained. The splendid Silurian sections near Heyington station were next examined and explained. The river was then crossed at the railway bridge, and the depressions along the river bank in Richmond Park were discussed. Crossing the river again at Swan-street, the old basalt quarry in Morang-road, Hawthorn, was visited, and reasons given for the occurrence of basalt on that side of the Yarra.

A report of the junior excursion to Studley Park on Saturday, 4th June, was forwarded by the leader, Mr. W. H. Wilson, who stated that the outing had been somewhat spoiled by unfavourable weather. The party met at Victoria-street Bridge, and first visited the road-cutting, when its principal features were explained. The flood plains along the Yarra, and the basalt outcrop at Burnley-street then received attention, after which the gravel pits and the reservoir in the park were visited, and the relationship of the geology of the former pointed out. A return was made through another road-cutting to Johnston-street Bridge. Altogether a very interesting afternoon was spent.

ELECTION OF MEMBERS.

On a ballot being taken, the following persons were duly elected members of the Club :—As an ordinary member, Mr. H. G. Haig, 20 Nicholson-street, Fitzroy ; as country members, Mr. Otto Helm, State school, Laver's Hill, Beech Forest, and Mr. J. Johnston, State Forests Department, Creswick ; as associate members, Mr. Sydney B. Abbott, Pakington-street, Kew, Mr. J. Kelso, 33 Kelso-street, Richmond, Mr. V. Maddison, 58 Clifton-street, Richmond, Mr. Reg. A. Routley, 37 Derby-street, Kew, and Mr. Robert Stocks, 30 Park-street, Parkville ; as junior members, Master Ivan Berthon, Victoria-road, Hawthorn, Master C. Tweddle and Master E. Tweddle, 18 Barkly-street, St. Kilda, Master R. M'Lister, Fitzroy-street, St. Kilda, and Master L. Watson, 12 Waterloo-street, St. Kilda.

GENERAL BUSINESS.

Mr. G. A. Keartland drew attention to the steps which were being taken in England with reference to the destruction of gay-plumaged birds for the requirements of fashion, and thought that the Club should request the Advisory Committee on the *Game Act* to take some action in the matter.

The suggestion was supported by Messrs. C. Barrett, E. B. Nicholls, J. A. Kershaw, F.E.S., and J. Shephard.

Mr. O. A. Sayce, A.L.S., said that Mr. G. M. Thomson, F.L.S., of Dunedin, and a member of the New Zealand legislature, was present, and could probably give some information as to what was being done in that country.

The Chairman welcomed Mr. Thomson to the meeting, and asked him if he could afford the members any information on the question.

Mr. Thomson thanked the meeting for its kind reception of him, and outlined what had been done in New Zealand in the way of providing sanctuaries and reserves for birds, but said that unfortunately the destruction of their ground birds by the introduced stoats and weasels was a very serious matter, and there seemed to be no way of combating the evil. He wondered at women using for personal adornment bodies of birds, beetles, spiders, and other things which they would be afraid to approach if alive.

The Chairman said the meeting seemed to be in sympathy with the remarks of the speakers, and it was resolved, on the motion of Messrs. Keartland and Coghill—"That this Club take action in support of the movement to prevent the use of gay-plumaged birds for decorative purposes, and that the matter be brought under the notice of the Advisory Committee on the *Game Act*, with the view of urging it to adopt such steps as may be necessary to secure that end."

Mr. J. A. Leach, M.Sc., thought that the matter should be brought directly under the notice of the Commonwealth Government, and moved accordingly. This was seconded by Mr. E. B. Nicholls, and carried.

THIRTIETH ANNUAL REPORT.

The hon. secretary, Mr. F. G. A. Barnard, read the thirtieth annual report, for the year 1909-10, which was as follows :—

“TO THE MEMBERS OF THE FIELD NATURALISTS' CLUB OF VICTORIA.

“Ladies and Gentlemen,—Your committee have much pleasure in presenting for your consideration the thirtieth annual report of the Club, being for the year ending 30th April last.

“During the year 64 new members were elected, consisting of 21 ordinary, 2 country, 9 associate, and 32 junior members. Some of those elected have, however, failed to complete their membership. There have been several losses by resignation, &c. The total membership now amounts to 324, and is made up as follows :—7 honorary, 2 life, 167 ordinary, 49 country, 19 associate, and 80 junior members. This total is slightly larger than that recorded last year, and is due to an increase in the number of ordinary members.

“Your committee greatly regret the death of Rev. J. J. Halley, a former president for three years, and who, while a member of the Club, was ever active in forwarding its aims.

“It is pleasing to note that the distinction of A.L.S. (Associate of the Linnean Society of London), limited in the number of holders, has been conferred upon a member of the Club, Mr. O. A. Sayce, a past president, and whose studies, it may be justly claimed, were stimulated by his membership of the Club.

“In order that the associate members might be induced to take a greater interest in the Club's doings, an addition was made to the rules in August last, whereby associate members may receive the *Naturalist* on payment of an extra two shillings and sixpence, and we are pleased to note that several associates have availed themselves of this provision.

“The monthly meetings continue to be well attended, and provide means for the meeting of friends and the interchange of ideas. At the April meeting Lieutenant Ota and a party of about forty naval cadets from the Japanese warships were present, and appeared to be greatly interested in the proceedings. At the February meeting the members were pleased to welcome as a visitor Mr. T. Steel, F.C.S., a former office-bearer of the Club, but who for many years has been a resident of Sydney, where he has taken an active part in natural history matters.

The papers read have been of the usual varied character, five of them being rendered more instructive by the help of lantern slides. For the provision of the lantern and its manipulation the Club is again deeply indebted to Mr. J. Searle, who has willingly given his time and skill for the benefit of his fellow-members.

“Nineteen papers were read, of which 9 dealt with zoological subjects, 3 with botany, 2 with geology, 1 with an extended trip,

and 4 with general subjects. All have been published in the *Naturalist*, in some cases with illustrations.

"The authors were Messrs. C. L. Barrett (two), A. J. Campbell, Col. Mem. B.O.U., F. Chapman, A.L.S., Prof. A. J. Ewart, D.Sc., C. J. Gabriel, J. H. Gatliff, J. C. Goudie, Dr. T. S. Hall, M.A., A. D. Hardy, F.L.S., J. A. Kershaw, F.E.S. (two), G. Lyell, F.E.S., A. H. E. Mattingley, C.M.Z.S., D. McAlpine, A. J. North, C.M.Z.S. (two), J. G. O'Donoghue, F. Pitcher, G. B. Pritchard, F.G.S., P. R. H. St. John, and G. A. Waterhouse, B.Sc., F.E.S. Again we are pleased to see new names among the contributors, and we desire to thank them for placing their contributions before the members. The papers generally have been of a high character, and in some cases have led to an extra demand for the *Naturalist*.

"In deference to the wish of several members, the March meeting was set aside for the purposes of a display by those members who take up the use of the microscope, and, in order to promote intercourse between the two societies, the members of the Microscopical Society of Victoria were invited to be present and take part in the conversazione and exhibition of specimens. The arrangement proved a success, and, we consider, might be repeated to advantage during the coming year.

"Many interesting natural history notes have been contributed at the meetings, but there is room for greater activity in this direction, and we would ask members to try and add to this portion of our meetings. The exhibits at the monthly meetings have hardly been as numerous as in some former years, and we would ask those who possess specimens to kindly bear in mind the interests of their fellow-members. Even the commonest specimens are sure to be of interest to somebody.

"The programmes of excursions for seniors and juniors, issued at the beginning of the year, have, with one or two exceptions, been duly carried out, and as a rule the excursions have been well attended. It is to be regretted that sufficient support was not given to the projected "camp-out" at Mt. Baw Baw at Christmas to enable it to be carried out, but we trust, with the opening of the Walhalla railway, and the consequent improvement in the facilities for reaching that interesting locality, that Mt. Baw Baw will ere long be the scene of a well-organized excursion. It would seem, however, from the experiences of recent years, better to abandon the idea of getting an excursion party together either at Christmas or Easter. The excursion to Warrandyte by motor, though on account of the weather a failure from a natural history point of view, was a great social success, and a similar outing seems worth putting down again. Several of the excursion reports presented by the leaders have almost ranked as papers, and in future years will be eagerly read as descriptions of sights and scenes which are likely to pass away in the course of the commercial development of the State.

"We are pleased to learn that the junior excursions have been well attended, and we trust the knowledge gained at these outings will be found of value by the juniors as they advance in years. We desire to thank one of the associate members, Mr. Chas. Stout, for his kindness in acting as secretary for the juniors, and so contributing to the success of their excursions. As an experiment, ribbon badges of an inexpensive character were distributed to the juniors to serve as a means of distinguishing them, especially when meeting at railway stations, with, we think, satisfactory results. We have also to thank Mr. E. B. Nicholls for his kindness in entertaining those juniors who attended the Black Rock excursion in October last.

"The leaders of the various excursions, both senior and junior, deserve the thanks of the members for placing their services and knowledge at the disposal of the committee. Leaders of excursions do not always get the support that their effort warrants, and we trust that during the coming year there will be no lack of enthusiastic followers. There is no surer way of getting a grip of facts in natural history than by observation in the field, and if this can be done in the presence of someone of riper experience, then the gain is all the more to the beginner.

"The usual exhibition of wild flowers was held at the October meeting, and was a great success. The suggestion was made that the exhibition should be extended to the second day, but it must be borne in mind that the work of the wild flower exhibition falls on a very few, which, with the fickle nature of the exhibits, makes it a difficult problem, so we leave it to our successors to consider and act upon.

"The twenty-sixth volume of the Club's journal, the *Victorian Naturalist*, has been completed, and issued to members, &c. Over sixty copies are distributed monthly as exchanges and to libraries, in addition to which there are a number of subscribers, non-members of the Club. Several requests have been received during the year for it as an exchange, so that it is evidently considered to be of some value in other parts of the world. The adoption of heavier wrappers has added somewhat to the expense of distribution, but we think this has been fully justified by the much-improved condition in which it reaches the members, especially when plates are included. We have to thank Mrs. F. C. Christy and Rev. E. H. Hennell for several volumes of back numbers, which will prove of great service in supplying the demands we constantly have for early parts. One complete set was sold during the year, probably the last which it will be possible to supply, though of many numbers the stock is very large. Several interesting illustrations were included in the volume just completed, and we trust there will be further improvement in this direction in the next volume.

"An interim report of the Plant Names and Records Sub-

Committee was read at the October meeting. This important work, undertaken by the Club, is progressing, but has naturally to be done with great deliberation, so that the progress is not very apparent to those outside the committee. Five meetings were held during the year, and a large number of names have been provisionally agreed upon.

"Along with other public bodies, the Club was asked to give an expression of opinion on the question of daylight saving, and your president and hon. secretary attended the Parliamentary Committee, and gave evidence in support of the idea.

"The Conservator of Forests was recently approached with reference to the reservation of certain land along the Monbulk Creek as a sanctuary for birds, animals, and plants. While not agreeing to specially reserve the area, the Conservator promised that no timber-cutting would take place in the area, and he also expressed himself willing to consider the Club's wishes with regard to other areas if brought under his notice.

"The question of the purchase of the land at Mt. William, near Lancefield, occupied by the aboriginal stone axe workings, was initiated by your committee during the year, and is at present under consideration by a joint conference of the Club, the Historical Society, and the National Parks Association, and we trust will be brought to a successful issue, so that almost the only spot in the State where direct evidence of the former owners of the soil can be seen will be preserved as a public reserve for ever.

"Your committee was pleased to note a movement at Ivanhoe for the purchase of a block of land on which is growing a fine Red Gum tree, for the purpose of preserving the tree, and, as a mark of the Club's interest in such matters, forwarded a donation of one guinea to the movement. We are pleased to learn that there is every probability of the required sum of money being raised.

"The hon. librarian reports that during the year some 20 volumes have been purchased, in addition to the usual periodicals. The exchanges have been very numerous, and most of them have been acknowledged from time to time in the *Naturalist*; among them may be mentioned several back volumes of the "Proceedings of the Royal Society of Tasmania," kindly supplied by the society in order to complete the Club set as far as was possible. Owing to lack of assistance, the card catalogue was much delayed, but has now been completed as far as authors' names of single volumes and the periodicals. A number of serials have been bound, and several others are now in the binder's hands. The library rules have been revised, and will be printed on cards for use as book-marks and as a reminder to those members who retain the books an unreasonable time. It is hoped that the publication of a catalogue in pamphlet form will be undertaken during the coming year.

"The financial position of the Club continues to be satisfac-

tory. The statement of accounts to be submitted herewith shows the receipts to have been £212 12s. 4d. and the expenditure £175 13s. 5d., leaving a credit balance of £146 16s. 2d., which is £30 better than at the commencement of the year, notwithstanding the heavy expenditure on the *Naturalist*. Though rather anomalous, the account at the London Bank shows a slight overdraft at the end of the year. This was incurred in order to save withdrawing from the Savings Bank account of £150, and the overdraft was repaid within a few days of the commencement of the new year.

"The committee desire to thank Messrs. Morton and Coghill for generously allowing the use of their office for committee meetings, and for other favours.

"In conclusion, your committee desire to thank all who by sacrifices of time and convenience have helped forward the work of the Club during the past year, and they trust their successors will have still greater opportunities of furthering the study of Natural History during the coming year than they have had, and would ask the members to leave no stone unturned in maintaining the Club as the leading society of the kind in the Commonwealth.

"On behalf of the committee,

"F. WISEWOULD, *Vice-president, Chairman.*

"F. G. A. BARNARD, *Hon. Secretary.*

"Melbourne, 30th May, 1910."

FINANCIAL STATEMENT.

The hon. treasurer, Mr. G. Coghill, read the financial statement for 1909-10, which was as follows:—

RECEIPTS.

To Balance, 30th April, 1909	...	...	...	£109	17	3
„ Subscriptions—						
Ordinary Members	£137	17	0			
Country Members ...	31	15	6			
Associates ...	4	19	0			
Juniors ...	4	8	0			
	—————			£178	19	6*
„ <i>Victorian Naturalist</i> —						
Subscriptions and						
Sales ...	2	8	3			
Back Numbers and						
Arrears ...	14	13	4			
Advertisements ...	6	15	0			
Reprints ...	6	5	6			
	—————			30	2	1
„ Sales of Badges ...	...	...	...	0	5	6
„ Interest ...	..	...	...	3	5	3
				212 12 4		
„ Balance due London Bank	...	...	...	3	3	10
				£325 13 5		

*Subscriptions:—Arrears, £39 15s. 6d. ; 1909-10, £127 7s. 6d. ; 1910-11, £11 16s. 6d.—total £178 19s. 6d.

EXPENDITURE.

By <i>Victorian Naturalist</i> —			
Printing	...	...	£85 11 5
Illustrating	...	...	9 9 0
Free Reprints	...	...	4 1 0
Reprints	...	...	3 19 6
			<hr/> £103 0 11
,, <i>Victorian Naturalist</i> —			
Wrapping and Posting			14 6 4
Wrappers	...	...	2 15 0
			<hr/>
			17 1 4
,, Rooms—Rent and Attendance		...	11 14 6
,, Library—Books	...		9 18 8
Periodicals	...		5 8 0
Binding	...		2 5 0
Insurance, &c.			1 6 1
			<hr/>
			18 17 9
,, Expenses—Wild Flower Exhibition	...		1 6 6
,, Slides—Wilson's Promontory	...		0 14 0
,, Ivanhoe Gum-tree Fund	...		1 1 0
,, Printing and Stationery	...		9 18 0
,, Printing, &c.—Junior Members	...		3 0 0
,, Postages and Sundries	...		8 19 5
			<hr/>
			175 13 5
,, Balance Melbourne Savings Bank	...	...	150 0 0
			<hr/>
			£325 13 5

G. COGHILL, *Hon. Treasurer.*
10th May, 1910.

Audited and found correct.

9th June, 1910.

DUDLEY BEST, }
J. SHEPHARD, } *Auditors.*

The following statement of assets and liabilities was also read :—

ASSETS.

Balance in Savings Bank ...	£150	0	0
Less Balance due London Bank ...	3	3	10
	<hr/>		
		£146	16 2
Arrears of Subscriptions and Reprints (£90), say ...		31	0 0
Library and Furniture (Insurance Value) ...		150	0 0
	<hr/>		
		£327	16 2

LIABILITIES.

Subscriptions paid in advance ...	£11	16	6
Outstanding Accounts, <i>nil</i> .			

The report and financial statement were received, on the motion of Dr. Hall and Mr. A. D. Hardy, F.L.S.

Dr. Hall, in moving the adoption of the report, &c., congratulated the committee on the excellent report of the year's work, and referred to the statement that probably the last complete set of the Club's magazine had been sold during the year. He thought that some of the Club's funds might be legitimately spent

in reprinting the few numbers necessary to enable sets to be made up for sale or for exchange purposes.

Mr. J. H. Harvey seconded the motion for the adoption of the report, which was carried unanimously.

ELECTION OF OFFICE-BEARERS.

There being no other nominations, the following office-bearers were declared duly elected:—President, Mr. F. Wisewould; vice-presidents, Mr. J. A. Kershaw, F.E.S., and Mr. J. A. Leach, M.Sc.; hon. treasurer, Mr. G. Coghill; hon. librarian, Mr. J. T. Hamilton, F.L.S.; hon. editor, Mr. F. G. A. Barnard; hon. secretary, Mr. A. D. Hardy, F.L.S.; hon. assistant secretary and librarian, Mr. C. Waters.

The hon. secretary announced that though seven persons had been nominated for the five vacancies on the committee, Dr. Hall and Mr. A. H. E. Mattingley, C.M.Z.S., had asked for their names to be withdrawn, owing to pressure of other engagements. The chairman therefore declared Messrs. R. W. Armitage, J. Gabriel, J. P. M'Lennan, F. Pitcher, and Dr. C. S. Sutton duly elected as members of committee.

PRESIDENT'S ADDRESS.

The retiring president, Prof. A. J. Ewart, D.Sc., then delivered a short address, in which he recalled some of the notable features of the past year's work. He referred to Dr. Hall's suggestive paper, "Ungarnered Grain," and regretted that up to the present there appeared to be little response to the writer's suggestions, also to the work being done by the Plant Names Committee. This work, he said, was progressing, but it was of such a character that it could only be done slowly. Speaking of the future of the Club, which he considered extremely rosy, there were two things to be avoided—the Scylla of over specialization, and the Charybdis of superficiality. The former might lead to the formation of cliques, and the proceedings drift into too technical a character, while under the second condition the treatment of subjects might be too superficial, and the Club become a mutual admiration society; such self-satisfaction would surely spell stagnation. It was difficult to exactly indicate future action—that must be a matter of common-sense adjustment; and, as the need of change becomes evident, the society must adapt itself, bearing in mind always its principal aim—the study of natural history. This should always be in the shape of field work. Hence the Club represents the "back to nature" cry in science. At one time systematic characters were the only points considered by naturalists. Afterwards laboratory results were deemed indispensable, and carried to such a pitch that, speaking broadly, some laboratory naturalists, when in the field, could hardly distinguish a crocodile from an earthworm. The present school combines

both types, and is more concerned with natural biological relationships. He had, however, sufficient confidence in the common-sense of the members to think that they will keep this phase of the question in view, and devote their attention mainly to field work, in which there was ample scope for all their energies.

Mr. F. G. A. Barnard proposed a vote of thanks to Professor Ewart for his helpful address, and expressed the regret of the members that, owing to pressure of his official duties, he had not been able to allow himself to be again nominated for the president's chair. At the same time he took occasion to congratulate the new president, Mr. F. Wisewould, on being chosen for the position, and said that Mr. Wisewould was one of the "original members" of the Club, and a consistent supporter of it for thirty years.

Mr. A. D. Hardy, F.L.S., in seconding the motion, said that now the custom of re-electing the president for a second term of office had been broken, he hoped it would not be adopted again, otherwise some of the older members eligible for the position would be very advanced in years before it came round to them. He trusted that Prof. Ewart would be able to attend some of the ordinary meetings during the year, and encourage them with his presence.

PAPERS READ.

1. By Mr. Arthur M. Lea, F.E.S., Government Entomologist, Tasmania (communicated by Mr. J. A. Kershaw, F.E.S.), entitled "The Guests of Ants, Bees, and Termites."

The more important portions of the paper were read by Mr. Kershaw. In it the author said it was well known that many kinds of beetles, &c., lived in ants' nests especially; that some appeared to be encouraged by the ants, whilst others appeared to be hostile. He briefly enumerated the different families often represented, and said that little had been done as regards the question in Australia, and asked that workers should take it up, and report results.

2 By Mr. F. Chapman, A.L.S., entitled "A Synopsis of the Silurian Fossils of South Yarra and the Yarra Improvement Works."

This paper, being of a technical nature, was taken as read. The author gave some account of the manner of occurrence of the fossiliferous rocks, and then gave a complete list, with references, of all species which have been described from the localities.

3. By Mr. A. D. Hardy, F.L.S., entitled "Mixed Pollen Collected by Bees."

The author stated he had met with so many bald statements to the effect that bees gather pollen from one species or form of

flower only during one trip, that he had been led to make some investigations on the subject, and though his results might not disprove the rule, he had, in the case of a domesticated bee, found four distinct kinds of pollen grains in the pollen basket. One of our native bees was found to have gathered at least ten kinds of pollen from plants generically very different, while a diseased bee, sent from New Zealand for examination, contained a variety of pollen grains in its stomach, though whether this food was obtained in the field or from the store in the hive could not be ascertained.

The Chairman said the record was one of great interest and value, and should encourage further observation of both domesticated, wild, and indigenous bees, as to their influence on the fertilization of flowers.

GENERAL BUSINESS.

Mr. D. Best moved a vote of thanks to the retiring office-bearers, and said that the Club had always been fortunate in its office-bearers, and that those who had held office had always been attentive to the duties, hence the success of the Club.

The motion was seconded by Mr. J. H. Harvey, and carried unanimously.

Mr. F. Pitcher moved a vote of thanks to the auditors, Messrs. Best and Shephard, which was seconded by Mr. W. Stickland, and carried.

Prof. Ewart then vacated the chair in favour of Mr. F. Wise, who briefly returned thanks for the honour done him, and trusted that the Club would not suffer by the election of a lay member instead of a scientific expert as its president.

Mr. J. A. Leach, M.Sc., said he had a number of certificates of membership of the Gould League for the Protection of Birds, and would be pleased to enrol any who wished to join.

Prof. Ewart said that several islands in Corner Basin had been reserved and added to the National Park.

EXHIBITS.

By Mr. J. A. Armitage.—Four photographs of features taken at the West Essendon excursion.

By Mr. R. W. Armitage.—Thirty rock specimens from West Essendon excursion in illustration of report.

By Mr. F. G. A. Barnard.—Block of stratified sand, showing colour bands, from Sand Pits, Saltwater River, West Essendon.

By Mr. Chas. Barrett.—Large-sized photograph of Gannet Rookery, Cat Island, Bass Strait.

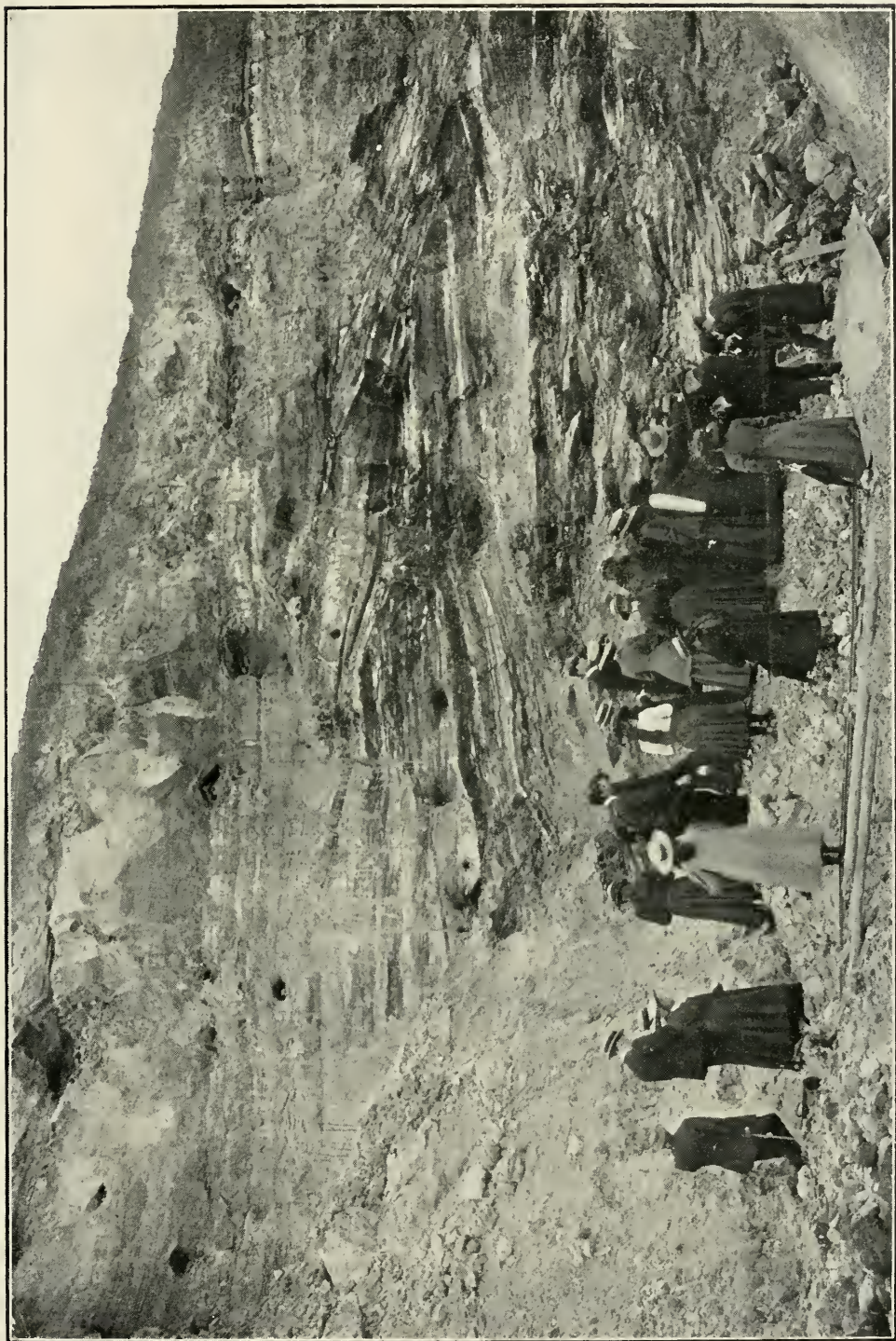
By Mr. A. D. Hardy, F.L.S.—Slide under microscope, showing four forms of pollen grains taken from pollen basket of a native bee, *Nomia metallica*.

After the usual conversazione the meeting terminated.

EXCURSION TO ESSENDON.

FAVoured by a fine autumn afternoon, about thirty members of the Club and half a dozen students from the Continuation School Geology Class assembled for this excursion on Saturday, 14th May. The outing had been arranged for the purpose of studying the geological and physiographical features of the country lying to the west of the railway, towards the Saltwater River, and the well-known "Horseshoe Bend," nearly two miles from the station, was made our objective. Proceeding westerly along Buckley-street, attention was drawn to the sandy nature of the surface soil, indicating probably that the underlying rocks are portions of the marine or estuarine Tertiary sandstones of southern Victoria. Descending into a broad, shallow valley, trending in a southerly direction towards the Saltwater River, some of the reasons for its shape were pointed out, and its form contrasted with the gorge-like characters of the younger valleys at present being carved out in country covered by the Newer Volcanic lava flows. As we proceeded the country became almost level in character, with here and there slight undulations. A little to our left was a wide, slight eminence capped with a thin mask of extremely vesicular basalt of the "bread-crust" type, the first outlier of the main area of the Newer Volcanic lavas of the Keilor Plains. Just near the wooden post marked "E. T. B.," which indicates the boundary between Essendon city and Keilor shire, a slight road-cutting revealed a splendid series of stages in the weathering of the older basalt, which underlies the Tertiary sandstone of the district. In parts the basalt is weathered into the softest of wackenic clays, which are white, creamy, yellowish, brown, pink, red, and black, according to the character of the iron salts staining them. A small creek crossing the road served to provide material for remarks on the erosive action of water. Here we saw how surveyors' marks, cut during the "land boom," seventeen or eighteen years ago, had become miniature runnels in time of rain, and, leading to the creek in question, it in turn had been deepening and widening its channel, so that it—a rejuvenated stream—bore all the characters of a canyon on a small scale. A short, sharp climb now brought us on to the highest elevation attained during the afternoon, the top of the eastern edge of the Keilor lava plains, which have replaced what must have been anterior to their formation an eroded land surface with its ridges and valleys. These have been covered up and a new drainage system superimposed on the country. At this point, just north of the Horseshoe Bend, numbers of quartzite and porcellanite chips and flakes of artificial origin, evidently left by the aborigines who formerly wandered over these parts, were picked up. A minute's walk southward brought the party suddenly in full view of the Horseshoe Bend of the Saltwater River. From a height of about 145 feet above sea level the Saltwater River could be seen 140

PLATE V.



VIEW OF THE SAND PITS, SALTWATER RIVER.

The F. N. C. Excursion Party at work.

Photo. by J. A. ARMITAGE.

feet below, at the foot of the steep slope. The river here, about 6 miles above its confluence with the Yarra, near Footscray, is still tidal, and continues so for some distance above this spot, and therefore is practically a dead stream, performing the work of transport of sediment loads only when in flood. On the opposite (Marilynong) side a fine series of river terraces could be easily distinguished on the alluvial flats in the bend, as many as four levels being noticed. The river-cliff sections here reveal the stratigraphical relations of the rocks, Newer Volcanic basalt overlying Tertiary sands and clays, which rest unconformably on the eroded surface of the Older Volcanic basalt. The Tertiary sands of the spur which runs to the south between the Saltwater River and the rejuvenated tributary before mentioned are economically important, an open cut, known as the "Sand Pits," having been made in order that the material may be easily taken out. These deposits will be described in greater detail on a future occasion. They show splendid sections of cross-bedded sandstones of shallow water origin, iron-stained in various tints of red and brown. A picture of a part of these sand pits, from a photograph kindly supplied by Mr. J. A. Armitage, and illustrating the nature of the current bedding, will be published with this report (Plate V.) It also shows the Club excursion party at work studying the features of the quarry. After examining a section of fairly fresh, finely-jointed Older Basalt close to the water's edge, the party left the quarry, and visited an outcrop of extremely hard quartzite at the southern extension of the spur. The members then wended their way back to the railway station, after an afternoon's ramble of a little over four miles, carried out under most delightful weather conditions.

I am indebted to our hon. secretary, Mr. F. G. A. Barnard, for a few notes on the botany of the outing. He says:—"The botany of the bank of the Saltwater River at the Horse-shoe Bend was at one time rather good, but what with the spread of introduced plants and shrubs, notably the African Boxthorn, and the inroads of cows, it has now almost disappeared. There are, however, several interesting plants to be found there, such as *Myoporum deserti*, which really belongs to North-West Victoria. There are some good-sized Blackwoods, Bursarias, Hymen-antheras, and Sheoaks (*Casuarina quadrivalvis*). One of the wattles, *Acacia retinodes*, grows at the water's edge. The "lignum," *Muehlenbeckia Cunninghami*, forms dense bushes in several places, and was in flower, as also *Aster ramulosus* and *Goodenia ovata*. The latter can be found in bloom almost any day in the year. *Mesembryanthemum australe* grew on the basaltic outcrop just above the stream, while as we walked across the plain the bright pink flowers of *Convolvulus erubescens* were noticed here and there."

I am exhibiting to-night some thirty rock specimens, illustrating the geology of this very interesting outing.—R. W. ARMITAGE.

THE GUESTS OF ANTS, BEES, AND TERMITES.

BY ARTHUR M. LEA, F.E.S., &c., Government Entomologist,
Tasmania.

(Communicated by Mr. J. A. Kershaw, F.E.S.)

(Read before the Field Naturalists' Club of Victoria, 13th June, 1910.)

THERE are many remarkable species of insects to be obtained in the nests of ants, bees, and termites ; some in large numbers, but others sparsely. The insects most commonly seen are beetles, but representatives of almost all orders are to be obtained in them.

Of the insects to be found in the nests, many are friendly, and are even encouraged by the ants, whilst others are hostile to them. As a rule the hostile species are remarkably sculptured, many having grooves into which their legs and antennæ can be withdrawn on the slightest alarm, so that to any inquiring ant the intruder appears as a small, angular lump of no importance. Some hostile species, however, depend on their extreme activity to save them from danger.

I do not remember ever seeing an ant attack one of its guests, either friendly or hostile. Whatever the cause of such abstention may be, it is not that the violent interruption to their ordinary work caused by the turning over of their shelter temporarily paralyzes them, because such shelter frequently covers two or more species of ants, and as soon as the different species begin to mix a series of infuriated combats takes place.

There are several ways of obtaining insects from the nests :—Digging the nest out and sending its entire contents through sieves—a plan seldom followed, in Australia at least. Digging it out and examining its contents over white paper. Flooding it so that all its inhabitants come to the surface. Examining it carefully after turning over its covering—stone, log, or bark. With many nests this is the only practical plan, and in country often collected over it is well to mark nests that have been productive of guests and to visit them occasionally. A nest examined very carefully and its covering replaced, will often yield specimens later on in the same day. With the ferocious “bull-dog,” “soldier,” and “jumper” ants one cannot spend very much time at an individual nest ; still, when the ground is fairly clear, several minutes at a time can be devoted to the nest of even the jumper.

With non-stinging ants it is generally best to kneel over the nest, or to recline at its side. At first nothing is visible but a scurrying mass of ants, but a trained eye soon begins to pick out the guests. These often strongly resemble the ants themselves, but may be detected by their different ways of walking or running. Often, however, beetles will be seen at the sides of the nest, and *Staphylinidæ* are frequently to be obtained amongst

the *débris* thrown out by the ants; they usually remain quite motionless for some time, but then start up as if in a violent hurry, and try to escape.

Sticks on the ground will often be found on being split up to be swarming with ants, and amongst these will often be found other insects. The galleries of white ants are seldom productive of insects, but nevertheless some species are to be found there that are seldom or never obtained elsewhere.

On thundery days, just before rain, nests seem to be more productive than at other times, and singularly enough midsummer seems to be the least productive period of the year, spring being, perhaps, the best.

Several singular facts are very conspicuous in a large collection of ants'-nest beetles:—1. The large percentage of species (in comparison with the total number of beetles) that are entirely without eyes, or with extremely small ones. 2. The numbers of species that have less than eleven joints (the usual number) to their antennæ. 3. Species having extremely small or hidden palpi. 4. Species with receptacles for the legs and antennæ.

A large proportion of the beetles found with ants belong to the family *Pselaphidae*, there being more of these than of all others combined. They are all small and more or less reddish, and move about amongst the ants in a most friendly manner. Any collector who pays much attention to ants' nests, must come across them, as they occur in the nests of most species of ants, and, although never in large numbers, the nests of some species are seldom without them. The genera most commonly found are *Articerus* (remarkable for each antenna being apparently composed of one joint, although there are really two, and for its apparent absence of palpi), *Euplectops* (with strongly sculptured prothorax), *Tmesiphorus* and *Ctenisophus* (with very curious palpi), *Eupines* (with prothorax highly polished, and without a sub-basal impression, such as almost all other genera have), and *Pselaphus* (with palpi often almost or quite as long as the antennæ). Other genera are found, but less commonly: *Somatipion* (with apical joint of antennæ curiously large and round), *Tyromorphus* (with large palpi), *Batrisodes* and *Batraxys* (with immarginate abdomen), and *Clavigeropsis* (like *Articerus*, but antennæ with more joints). In other parts of the world the blind genera, *Adranes* and *Claviger* are known, but all our species have eyes, although sometimes very small ones.

Most of the *Pselaphidae* of ants' nests feed on mites, with which the nests are often abundantly supplied. But some of the *Clavigerides* have the mouth parts atrophied, and the fanciful supposition has even been published that they are used for scenting the nests.

The *Scydmænidæ* are very similar in appearance to the *Pselaphidae*, but with their elytra completely covering the abdomen (in

the *Pselaphidæ* the elytra are very short, and some of the abdominal segments are exposed). They also feed on mites, and move about freely amongst the ants. The family is a much smaller one than the *Pselaphidæ*, but a good many species are to be taken in ants' nests.

Another family which is largely represented in ants' nests is the *Staphylinidæ*, and many of these appear to depend for safety amongst the ants by their strong resemblance to the ants themselves. Some of them are undoubtedly hostile, but others feed on mites, and so are regarded as friendly. *Falagria*, *Myrmedonia*, *Polylobus*, *Calodera*, *Homalota*, *Dabra*, *Conosoma*, *Philonthus*, *Sunius*, *Oxytelus*, *Eleusis*, *Lispinus*, *Glyptoma*, and other genera are to be found with the ants, sometimes in abundance, but usually rarely. Few of them, however, are so singularly modified as are some of the hostile groups, *Glyptoma* being, perhaps, the most remarkable.

Of ants'-nest beetles, perhaps the most singular are those of the genus *Chlamydopsis*, and the allied genus *Orectoscelis*, of which fifteen species (including some shortly to be published) are known. These all, when at rest, have the head withdrawn into the thorax, with the basal joint of the antennæ fitted into grooves, and some of the legs also packed into grooves or otherwise protected. Most of them have the shoulders raised into hollow epaulettes, and usually with a tuft of golden hairs or a fine membrane proceeding from the hollow. One species recently taken by Mr. Davey has the hind legs fully twice the length of the body; another taken by Mr. Goudie resembles a scrap of charcoal, and there is not one but has some remarkable aberration. They are, however, all extremely rare, and probably of no species is there more than one specimen in any collection, with the single exception of *C. formicicola*, which was taken in some numbers by the late Rev. R. L. King about Liverpool, New South Wales. Some of them were taken on fence tops, &c., but many ants'-nest species come out at dusk to pair on tops of fences, or similar situations. They are probably all hostile to the ants.

In the family *Ptinidæ* there are some very curious genera—*Polypliocotes*, *Diplocotes*, *Hexaplocotes*, and *Enasiba*—all of which have the terminal joints of antennæ of singular form, and the palpi almost or entirely concealed—a most unusual thing with insects, but fairly common in ants'-nest species. In *Ectrephes* and *Paussoptinus* the palpi are similar, but the antennæ are dilated much as in the curious family *Paussidæ*. They are probably all hostile.

The *Paussidæ* is a family of beetles remarkable for the shape of their antennæ, and which are usually considered as belonging to the *Clavicornes*, but by some are now associated with the *Carabidæ*. All the species are supposed to feed on ants, although

they are seldom actually found in their nests. We have many species in Australia, but, with four known exceptions, they all belong to the genus *Arthropterus*, and of these most of the known specimens have been taken at lights. They have the power of projecting a liquid that on exposure to the air explodes with a slight noise, and is slightly caustic in its action, somewhat like the well-known bombardier or smoke beetles. The explosions can be caused even after death by pressing the bodies of the insects. Most of our species are extremely rare.

The *Colydiidæ* are represented by two genera that, so far, have only been found in ants' nests. Of these *Kershawia rugiceps* (the only species of its genus), has the head wide, mouth parts very small, and antennæ very peculiar. *Nepharis* is represented by four species (one as yet to be named), of which *alata* has the prothorax curiously inflated on each side; *costata* has the prothorax strongly ridged, and a remarkable flange-like process on the lower surface of the head; and *Goudiei* has very singular antennæ and eyes so small as to be almost invisible.

The *Trichopterygidæ*, a family of very minute beetles, is represented by at least four blind species of the genus *Rodwayia*, and, being extremely minute, they are easily overlooked, so that probably many more have yet to be found, as, so far, not one species has been recorded from South Australia or Queensland, where they probably only need looking for to be found, and only one from Western Australia and New South Wales. Tasmania has produced three species, and the nests of some species of ants, particularly *Colobopsis gasseri* and *Polyrachis hexacantha* are seldom without them; in a large nest of the latter species of ant sometimes thousands of specimens of *R. ovata* occur, hundreds being in sight at the one time. Their nearest relation is a North American genus, *Limulodes*, that is also blind and occurs in ants' nests.

One singular species from Queensland, shortly to be described and figured under the name of *Tretothorax cleistostoma*, appears to be the sole representative of a new family. Most of the specimens of it are obtained covered in mud, but on removing this a hole can be seen right through the prothorax, and the palpi are entirely concealed.

Of the *Scarabæidæ* a few species have been taken in nests, but apparently as chance visitors; but probably all the numerous species of *Cryptodus* visit ants' nests. As their mouth parts are curiously modified, they are probably hostile. They are also amongst the largest of the visitors, some of the species being almost an inch in length.

The *Curculionidæ*, or weevils, the largest of all families of beetles, is represented by a single minute species of the genus *Tasmanica*; although *Cordus hospes*, of the allied family

Brenthidæ, has been taken in the nests of many species of ants and termites.

The *Carabidæ*, the second largest family of beetles, are represented by but few species, of which three belong to the genus *Adelotopus*; these, although of oblong shape and with very short legs, are extremely rapid in their movements. As, however, most of the family are carnivorous, many of them eat ants away from their nests.

The *Tenebrionidæ*, another very large family of beetles, is represented only by a single species of *Tribolium*, the only one indigenous to Australia, although several introduced species of the genus are known to occur here.

The *Lagriidæ* are represented by *Lagria formicicola*, which lives in nests of the ferocious Bull-dog Ant, *Myrmecia forficata*; the common *L. grandis* is also an occasional visitor to nests under stones.

From the nests of white ants, so far, very few beetles have been taken, but probably many will yet be found there. At present only two species of *Articerus* and of *Tmesiphorus*, and one each of *Batrisodes* and *Eupines* are all the *Pselaphidæ* known from such nests. *Cordus hospes*, of the *Brenthidæ*, is sometimes common. Of the *Scarabæidæ*, *Mæchidius tibialis*, was seen in numbers in a nest by Mr. Froggatt, and Mr. Elgner has taken a fine *Norapus* at Cape York in the larval and pupal stages, as well as the beetles themselves; he has also taken an *Amarygmus* and a species of *Erotyllidæ*, as well as the larvæ of another from a nest, and several other larvæ belonging to the *Carabidæ*. One species of *Dabra* (*Staphylinidæ*) was taken in a nest of *Coptotermes raffrayi* in Western Australia, and a species of an allied genus in a nest in New South Wales. These complete the list, with the exception of a small species, the position of which is doubtful, and of which the only known specimen is too badly broken to be named.

Our native bees' nests have seldom been examined for insects, but one singular species of *Brachypeplus* (family *Nitidulidæ*) is known to occur in nests about Sydney. In deserted hives of the common bee, *Ptinus exulans* (of the *Ptinidæ*), sometimes occurs in large numbers.

Stylopidæ, parasitic on the bodies of various bees and wasps, so far have not been recorded from Australia (but several species that attack *Homoptera* have been recorded from Queensland). One species, shortly to be named, has been taken in Western Australia; and Mr. Aug. Simson sent to England a Tasmanian wasp, in the abdomen of which a female *Stylops* was noticed. The family is a remarkable one, and although many entomologists regard it as an aberrant group of beetles, the majority look on it as forming a distinct order.

Some species of aphides and scale insects (mostly mealy-bugs)

are fairly common in nests, and these are the celebrated "cows" of the ants. They are usually seen attached to roots, from the immediate vicinity of which all the earth has been cleared away, and the ants protect them on account of the nectar-like substance (honey-dew) they exude. On turning over a stone it is not at all uncommon to see hundreds of specimens attached to roots, with the ants moving about them. The ants will frequently extend their galleries on to trees to protect some particularly fancied group of "cows," a favourite in this respect being the large cottony-cushion scale, *Icerya purchasi*.

Of the *Hymenoptera* some very curious forms have been seen in nests, and probably many species could be reared from ant pupæ. Hitherto, however, very little attention has been paid to these. In Tasmania one extremely minute species has been obtained, with apparently only one pair of wings, but appearing to belong to the *Mymarides*. Other interesting forms are quite wingless.

The larvæ of several species of flies have been seen in nests, but, so far, only one genus of these appears to have been reared to maturity. The larvæ of this genus are fairly large, flat on the under surface and convex on the upper. The pupa is much like the larva in appearance, but is covered with curious net-like markings, which become very conspicuous after the flies emerge. The curious so-called bee-louse (*Braula*, really a degraded fly), has been obtained in Tasmania, but is an introduced species.

A small wingless cricket is fairly common in the nests of some species of ants in South Australia, Victoria, and New South Wales, and, so far, appears to be the only orthopterous insect so recorded.

Lepidopterous larvæ are occasionally to be seen in nests, and a beautiful Queensland butterfly passes all its earlier stages in nests of the well-known green tree-ant.

In some nests *Thysanura* (minute spring-tail insects, of which some ants'-nest species have been dealt with at length by Lubbock) are to be obtained in abundance, and probably hundreds of species actually occur in Australia. They are, however, very active, and readily escape inexperienced hands. Probably the best method of capturing them is to wet the tip of the tweezers, or a small twig, with spirits, and touch them with it. When placed in spirits they generally float for a little while. Some yellow, actively-running species that look like small silver-fish are fairly common in nests.

Mites, or *Acaridæ*, are to be found in any old-established nest, and in some of them they swarm. A tortoise-like species, of a bright red colour, with minute yellow dots, and fully as large as the head of a common pin, is quite common in nests of the soldier ant. Others of the same genus occur in nests of the jumper ants and of the singular genus *Amblyopone*. They are

extremely slow in movement, so that, despite their bright colours, they are easily overlooked. Most of the species live detached from the ants, and some are so extremely small (dust-like, in fact), that they are easily missed, even when specially searched for.

Some of the species attach themselves to the ants, usually to the legs, but one Tasmanian species fastens itself to the middle of the body, and as it is of a flesh colour, whilst its host ant is black, it is readily seen. So many occur in a nest sometimes that at first it appears as if two species of ants were living together.

One species taken by Mr. Davey, near Geelong, has immensely powerful legs. Mr. Goudie writes of a Sea Lake species that jumps (no other jumping mite of any sort is known to me), and many other species are strongly at variance with ordinary *Acaridæ*.

At the present time several Australian entomologists are co-operating to collect the guests of ants. A paper dealing with the beetles has almost been completed by myself, but much remains to be done with the other groups, and the material in hand is far too scanty when the large field from which it is drawn is considered. When sufficient quantities of materials of the other groups are available, these will be sent to various specialists, whose papers on them it is hoped to have published by the Royal Society of Victoria. When the papers referring to the other groups have been published, the whole of the specimens, other than those retained by the specialists as types, will be deposited in the National Museum in Melbourne, and it is therefore desirable to make them as representative as possible. Many of the beetles are already there, and others will shortly follow.

The present time, therefore, seems a very good one to search the nests of ants, bees, and termites for visitors. Two Victorian naturalists, Mr. J. C. Goudie, of Sea Lake, and Mr. H. W. Davey, of Geelong, have done much to work up our ants'-nest insects; but it is now suggested that other naturalists should collect all classes of ants'-nest insects and mites and forward them to Mr. Jas. A. Kershaw, the Curator of the National Museum, or to myself, Department of Agriculture, Hobart. In every instance the collector's name will be acknowledged when the new species are described.

In collecting the specimens it is as well to place them in small tubes of spirits (methylated will do) with several specimens of the ants, bees, or termites in whose nests they were taken; or, if they are mounted, specimens of the ants, &c., should be attached to the same pins as the specimens, and preferably mounted on the same cards.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, the 11th July, 1910.

The president, Mr. F. Wisewould, occupied the chair, and about 150 members and visitors were present.

CORRESPONDENCE.

A letter was read from the Secretary for External Affairs, in reply to the Club's request that the Commonwealth Government should take steps to support the movement initiated in England to better protect gay-plumaged birds, drawing attention to an enclosed copy of proclamation published in the *Commonwealth Gazette* of 31st October, 1908, prohibiting the importation into the Commonwealth of the plumage, &c., of birds which are protected in the country of their origin.

The President remarked that that was all very well so far as importation was concerned, but that a further step was required, by which exportation from the Australian Commonwealth of Australian bird skins would be made illegal and severely punishable.

Mr. E. B. Nicholls drew attention to the revenue received by the Papuan Government for bird collectors' licences, £15 having been paid in fees, observing that to his mind this was a strange way of discouraging collectors. It was left in the hands of the committee to take what further action it deemed desirable.

From the Australasian Association for the Advancement of Science, calling attention to the next meeting to be held at Sydney, from 9th to 14th January, 1911.

REPORTS.

A report of the junior excursion to the National Museum on Saturday, 2nd July, under the leadership of Mr. J. A. Kershaw, F.E.S., Curator of Zoology, stated that there had been an attendance of about thirty juniors, who evinced great interest in the subject of the afternoon—butterflies—and by their questions and remarks indicated that their interest was no passing fancy.

The hon. librarian reported the receipt of the following donations to the library:—"Botany of To-day," by G. F. Scott Elliot (purchased); "Bulletin of the Geological Survey of Victoria, No. 23—Biographical Sketch of the Founders of the Geological Survey of Victoria," by E. J. Dunn, F.G.S., and Bibliography, by D. J. Mahony, M.Sc., F.G.S., and "Memoirs of the Geological Survey of Victoria, No. 9—The Geology of the Camperdown and Mount Elephant Districts," by H. J. Grayson and D. J. Mahony, M.Sc., F.G.S., from the Mines Department, Melbourne; *Journal*

of *Department of Agriculture*, May, June, and July, 1910, from Secretary for Agriculture, Melbourne ; *The Emu*, April, 1910, from the Australasian Ornithologists' Union ; *The Geelong Naturalist*, March, 1910, from the Geelong Field Naturalists' Club ; reprints of papers by Prof. Ewart, &c., and "Index to Recording Census," from National Herbarium, Melbourne ; "Annual Report, Department of Mines, N.S.W., for 1909," from the Secretary for Mines, Sydney ; "Forest Flora of New South Wales," vol. iv., part 9, by J. H. Maiden, F.L.S., Government Botanist, from the author ; *Agricultural Gazette of New South Wales*, May, June, and July, 1910, from the Secretary of Agriculture, Sydney ; "Proceedings Linnean Society of New South Wales," vol. xxxv., from the society ; *Queensland Naturalist*, December, 1909, and March, 1910, from the Queensland Field Naturalists' Society ; "Records Western Australian Museum," vol. i., part 1, from the trustees Western Australian Museum, Perth ; "Proceedings Royal Society of Tasmania," 1909, from the society ; "Records of the Canterbury Museum, N.Z.," vol. i., part 2, from the trustees ; *Selborne Magazine*, December, 1909, January-May, 1910, from the Selborne Society, London ; *Science Gossip*, vol. ii., Nos. 1-11, from the editor, London ; *Bulletin of the New York Botanical Garden*, vol. vii., parts 23 and 24, from the Director ; *Entomologista Brasileiro*, anno 3, No. 1, from the editor ; and "Proceedings of the Hawaiian Entomological Society," vol. ii., part 2, from the society.

ELECTION OF MEMBERS.

On a ballot being taken, Mrs. Carrie Templeton, George-street, East Melbourne, and Mr. Sydney Smith, 45 Hoddle-street, Richmond, were duly elected as ordinary members, and Mr. Claude Bagot, 226 Lygon-street, Carlton, as associate member of the Club.

LECTURE : "OUR NATIONAL HERITAGE—THE GUM-TREES."

The President said that in place of the usual papers by members, the meeting would be favoured with a lecture by Mr. R. T. Baker, F.L.S., of the Technological Museum, Sydney, entitled "Our National Heritage—the Gum-Trees," and, introducing Mr. Baker to the meeting, welcomed him on behalf of the members and visitors.

Mr. Baker briefly acknowledged the welcome, and said that, far from experiencing any coldness as a sort of trespasser from a neighbouring State, the warmth of welcome given him in Melbourne had made him feel thoroughly at home. The Technological Museum, Sydney, though a State institution, was, in its work, a Federal institution, recognizing no boundaries within the Commonwealth, and advice and assistance was given to other States as freely as to that of New South Wales ; and his offer to lecture before the Club had been made because he believed the Society

was a live one, and, further, he always looked forward to its monthly publication with pleasure.

He wanted on this occasion to try and interest the members and visitors in the capabilities of those truly Australian trees, the gum-trees. Much investigation of their products had been undertaken, but far more remained to be done. The Americans were systematically exploiting our country for their own benefit. In many ways they really knew more about our gum-trees and their capabilities than we did ourselves, while the Germans were equally keen as regards the oil production. Australians seemed to have no idea of the valuable asset they possess in the many varieties of eucalyptus. Their sole aim seemed to be to clear the land of all timber as quickly as possible, and if they did happen to plant a tree or two for shelter to use the vegetation of some other land which was quite unsuitable for the conditions existing here. His recent visit to South Australia had greatly interested him, for he found that near Adelaide great use was being made of the Sugar Gum as an avenue tree and for break-winds. When travelling in the express he could not but remark the great extent of treeless plains on the western side of Melbourne, and hoped that ere long they would be replanted. When he arrived in Australia 30 years ago and commenced the study of the Eucalyptus genus he quickly came to the conclusion that quite as much in the way of classification could be done by the chemistry of the oils as by the study of the external parts of the trees, and he had many times since proved that trees which to the lay observer seemed identical, if considered by their oil produced were totally different. It might be said that difference of situation or soil or age might account for the chemical differences in the oil, but he had found that the oil—*E. amygdalina*, for instance—yielded the same chemical constituents whether produced in America, Algeria, Victoria, or New South Wales. He maintained, therefore, that in dealing with the Eucalyptus chemistry and botany must work hand in hand. Australia was remarkable for the uniformity of its forest trees, and this was attributable to the fact that for many thousands of years there had been no great upheavals or submergences. Australia had long been dry land when the other continents were in process of development. It might be said to be in a quiescent state from a geological point of view. Hence we find a constancy in its fauna and flora not met with in the other continents. Its fauna and flora consisted in a great part of forms which had disappeared from other quarters of the globe, therefore, when Captain Cook discovered Botany Bay, 140 years ago, the naturalists accompanying him were at once struck with the singularity of its fauna and flora. It was a remarkable fact that the first Australian product sent to England was some eucalyptus oil, consigned to a Mr. Wilson. He would very much like to know what became of that oil. The

name gum-tree was somewhat unfortunate, as the exudation from which the trees first derived their name was a kino, more closely related to a resin than a gum. The scientific name first proposed for the genus was *Aromadendron*, which referred to the odour given off by the leaves, the name *Eucalyptus* referring to the operculum or covering of the flower buds. This characteristic distinguished the genus from the allied genus *Angophora*, which has no operculum. It was somewhat remarkable that with the exception of one or two species found in New Guinea and the Malaysian islands eucalypts were not found in any other part of the world than Australia, and here it was the prevailing genus from north to south or east to west, with the exception of a comparatively narrow area extending from Spencer's Gulf to the Gulf of Carpentaria, which geologists tell us is the dried-up bed of an ancient sea. It was also noticeable that the smaller species inhabited the inland districts, while the more robust species grew nearer the coast. The hardiness of many species was quite remarkable. Thus *E. Dawsoni*, Slaty Gum—one of the most useful timber trees we have—did best on dry, barren ridges where nothing else would grow. Hence it was a tree that should be encouraged wherever possible. In the early days the different species received their names from the characteristics they appeared to possess to the ordinary man. Thus *E. piperita*, the Peppermint Gum, received its name from the supposed resemblance of its odour to the herb peppermint, and analysis of the oil showed that the first guess was correct. Of what use the oil was to the tree had long been a puzzle, but he advanced the theory that by means of its oil the tree was able to resist droughts. This might seem rather a far-fetched idea, but a little consideration would show that there seemed to be some ground for the idea. It might have been noticed by those who have been out among the trees in hot weather that the odour of the leaves was then very perceptible, and he thought that there was a sufficient oily aromatic exhalation from the leaves on such an occasion as to prevent the rapid evaporation of moisture, hence the tree was able to resist droughts to a greater extent than many other genera. Without doubt the oil industry was only in its infancy. Great credit was due to the late Mr. J. Bosisto, C.M.G., for his persistent efforts in placing eucalyptus oil before the medical profession, but the amount of oil used in that way could never become a serious item. It was when it came to be used in industrial projects that the demand would spring up, and, whatever the demand, there would always be a ready response. The eucalyptus tree was very different to most other kinds of vegetation. If cut down it grew again, and in the course of a few years was again ready for cutting. A pine tree when cut down was killed and must be replaced. Then its rapidity of growth was unequalled by any other tree. A gum of 24 years' growth would

yield timber of equal bulk to that of an oak 200 years old. The oil industry should be developed, but producers must learn to keep the oil of each species distinct. The chemical constituents were so varied that by mixing the oils many of them were ruined for practical uses. There need be no difficulty in distinguishing the different groups of species yielding the various constituents, for it was found that precisely what kind of oil would be yielded could be predicted from an examination of the venation of the leaves. Thus those species in which there was a very indistinct marginal vein, and the secondary veins were almost at right angles to the midrib, were richest in eucalyptol, while as the veins branched off at a more or less acute angle to the midrib so the yield of eucalyptol became less and phillandrene became more and more. This constituent had been some trouble to the makers, as oils containing a large percentage of it were considered worthless, but it had recently been discovered that after numerous trials of other oils a phillandrene eucalyptus oil was the one best suited for use in a certain process for recovering concentrates in mining, hence its value must rapidly improve. The Silver-leaved Iron-bark of Queensland, *E. Staigeriana*, yielded citral, a constituent from which ionone is obtained, and which is the basis of the artificial perfume of violets, so that this is a very valuable eucalyptus oil. Then there were other constituents of great value. The Lemon-scented Gum of Queensland, *E. citriodora*, depended for its odour on the citronellal contained in its oil. This was now being used as a substitute for citronella oil in soap-making, &c. In another species, *E. camphora*, endresol was a prominent constituent; no use had yet been found for it, but he had no doubt but that it would prove of great value. Perhaps the widest field which he could see at present for a eucalyptus oil was that of the Silver-topped Stringybark, which was almost pure turpentine, and he ventured to say that when the yield of turpentine from the pine trees of America fell off owing to the destruction of the forests, Australia could easily provide the world with turpentine. He was glad to see such excellent products being made from the gum-trees of Victoria as was being done by Cuming, Smith and Co. at their works at Warburton. There acetic acid, ethyl alcohol, formalin, tar, pyroligneous acid, and many other chemicals were being manufactured, while the resulting charcoal, at first regarded as a waste product, was now almost the most valuable, being in great demand by the users of the new suction gas engines. Regarding the capabilities of the gum-trees from a timber point of view, he said that in this respect they were also invaluable. For many purposes no better timber could be obtained in the world. The breaking strain of the Victorian giant gum, *Eucalyptus regnans*, had been proved to be better than that of the far-famed hickory of America, and for coach-building purposes it could not be excelled. Their

capabilities for artistic work were becoming more recognized, and from the common Red Gum of the Murray, *E. rostrata*, most handsome furniture and other articles could be manufactured. During the course of his remarks the lecturer showed an excellent series of lantern slides, illustrating the types, leaf anatomy, wood-sections, &c., of different species of eucalypts; the progress made in cultivating them in America, South Australia, &c. His statements with regard to cultivation in America were a great surprise to the majority of the audience. He related a case where a farmer had given over his wheat-fields, amounting to 70,000 acres, to the growth of gums, and derived a better profit from them than from wheat. The trees are regularly lopped, and supply an immense amount of the best fuel for the stoves so common in American houses. In addition, fencing material, and timber for other purposes is already produced there from gum-trees.

The lecturer drew attention to a number of exhibits which he had brought to illustrate his remarks. These included a fine series of essential oils, articles made from the timber, manna, &c., in addition to which Messrs. Cuming, Smith and Co. had kindly made a fine display of the various products made at their Warburton works.

The lecture was concluded amid hearty applause, and the Chairman thanked Mr. Baker for the interesting way in which he had dealt with the subject. He felt sure that if his remarks could be spread broadcast much greater respect would be shown towards the gum-trees.

Mr. F. G. A. Barnard said that during a visit to Adelaide twelve months ago he had been greatly pleased to see the number of splendid Red Gums still remaining within the immediate surroundings of the city; and with regard to the absence of gum-trees on the Keilor Plains, remarked on by Mr. Baker, it was simply that they never existed there on account of the unsuitable climate and soil.

Mr. R. Kelly said, with regard to tree-planting in South Australia, if Mr. Baker had visited the northern agricultural areas he would have found that very little attention had been paid to the preservation of the eucalypts.

Mr. A. D. Hardy, F.L.S., outlined what has been done by the Forest Department in Victoria, and regretted the Conservator of Forests had been unable to be present, owing to having been called away to the Wimmera on departmental business. He said that large plantations of Victorian hard woods were being made wherever suitable areas could be found.

EXHIBIT.

By Mr. C. French, jun.—Three new Victorian scale insects—viz., *Fiorina anomala*, Green, collected by Mr. J. E. Dixon at South Morang; *Aspidiotus cingulatus*, Green, and *A. pauciglandulatus*, Green, collected by himself at Lake Albacutya.

After the usual conversazione the meeting terminated.

A SYNOPSIS OF THE SILURIAN FOSSILS OF SOUTH YARRA AND THE YARRA IMPROVEMENT WORKS.

BY FREDK. CHAPMAN, A.L.S., &c., Palæontologist to the National Museum, Melbourne.

(Read before the Field Naturalists' Club of Victoria, 13th June, 1910.)

GENERAL REMARKS.

FROM about the year 1895 to the present time excavations have been made along both sides of the Lower Yarra from Brander's Ferry to some little distance beyond the South Yarra railway bridge—roughly speaking, about a mile and a half in length—in order to straighten and otherwise improve the course of the river. This has been effected by cutting across two meanders. By this undertaking the probability of floods in the low-lying parts of Richmond and South Yarra has been prevented; and at the same time it has opened the water-way, thus giving better facilities for boating, as witnessed in the institution of the Henley-on-Yarra Regatta. The necessary excavations have been made chiefly in the Melbourne bed-rock, of Silurian age; but river silt, marine and estuarine shell-beds, and basalt, all of Pleistocene age, have also been met with in the work. The advantages which these excavations have offered to palæontology are incalculable, for the mudstones and sandstones of South Yarra have been proved to contain many forms of life not found elsewhere in Victoria. The enormous heaps of Silurian mudstone, and the rarer impure sandstone, have been diligently searched, hammer in hand, by several ardent fossil collectors, pre-eminent among them being our fellow-member, Mr. F. P. Spry. He it is who deserves the thanks of those who are helping to work out the Victorian Silurian fauna, for having secured many a rare specimen which, but for a timely examination of the excavated rock, would probably have been covered up, or used elsewhere for filling in swamps and depressions.

To realize the value of some of the discoveries we need only mention *Pterygotus australis*, a eurypterid or "sea scorpion," the first found in Australia, which the late Sir F. M'Coy described as near "*Pterygotus bilobus*, Salter, sp., of the black, flaggy, uppermost Silurian rock of Lesmahago;" the beautiful spinose brittlestar *Gregoriura spryi*, the type of a new genus; and the bivalve *Cardiola cornucopie*, Goldf., sp., which links our Silurian shallow-marine deposits with those of Bohemia and Great Britain. That these deposits were formed at the margins of the Silurian sea, and were directly influenced by tides and currents, is proved by the frequent occurrence of false-bedded shales and sandstones. This is supported by the general aspect of the fauna, which consists of organisms that lived in shallows and on mud flats, obtaining their food, much as do their related forms at the present day, from the decaying particles and small fry disseminated through

the waters. The principal of these organisms seem to have been the trilobites, pod-shrimps, bivalves, and worms; but corals, graptolites, star-fishes, brittle-stars, brachiopods, gasteropods, pteropods, cephalopods, cirripedes, eurypterids, and a doubtful plant are also comprised among the fossil remains.

The majority of the fossils recorded from the Melbourne division of the Victorian Silurian point to the rocks in which they are found as being low in the series, a view already expressed by Professors M'Coy and J. W. Gregory.* The recent discovery by Mr. Spry of *Ampyx* supports this idea, for that genus is typically Ordovician, and found only sparingly in the Silurian. The graptolites and the *Streptelasma* also tend to strengthen this conclusion. There is, however, a peculiar and marked admixture of fossils which, elsewhere, are typical of the newer Silurian, as seen in the abundance of star-fishes and brittle-stars, which in Great Britain occur in the Ludlow series; as well as in the striking abundance of the genus *Palæoneilo*, of types almost peculiar to the Upper Silurian or Lower Devonian of North America. On the other hand, when compared with our Yeringian series, the fauna is not so consistently Wenlockian, but more decidedly of an older facies.

It may be mentioned for the advantage of collectors of fossils from the Silurian mudstone of this locality that the darker blue and yellow layers, being harder, yield the best-preserved specimens; for no shelly structure is retained by any of the fossils, which are in the form of casts or moulds, and easily abraded. In spite of this drawback, the fineness of the muddy sediment has permitted the minutest detail of surface-structure to be preserved; as, for instance, in the case of the brittle-star before mentioned, which shows the slender, minute spines near the adambulacral ossicles quite distinctly, appearing as red iron-stained casts on a yellow matrix.

For the reason that the dark indurated mudstone† of the Domain-road sewerage works may possibly belong to a slightly different palæontological zone, we have, in the subjoined list of fossils, marked both localities with distinctive letters. It seems more likely, however, that it is the same bed intensely indurated by the numerous intersecting felsitic dykes found throughout the Silurian in that area, the occurrence of which was especially noted by Mr. Spry, who has kindly informed me of this and many other points of interest in connection with the locality.

My objects in bringing forward this list with notes are—first, to present the collected fauna of the locality as known at the present time, comprising about 67 species; and, second, to point out to our fossil collectors, actual or prospective, the possi-

* See Gregory, J. W. ('01), p. 181.

† This particular rock is often so exceedingly hard as to resemble lydite or hornstone.

bility of their making some good finds, before the opportunity is lost to us by the cessation of the excavating work and the waste and destruction of those heaps of rock-débris already to hand.

LIST OF FOSSILS FROM THE SILURIAN (MELBOURNIAN), SOUTH YARRA, with references to figures and descriptions, and notes on the species.

[Y = Yarra Improvement Works and neighbourhood of Alexandra-avenue. D = Domain-road Sewerage Works.]

(?) PLANTS.—FUCOIDS.

Y. *Bythotrephes tenuis*, J. Hall.

Ref.—Blandowski ('58), pp. 144, 145, 2 pls. Chapman ('03), pl. XVI., fig. 1.

Examples of this fossil are in the National Museum. They were found by W. Blandowski in 1858, "in a quarry near the gates of the Botanical Gardens" (between Old Pumping Station and Botanical Bridge).

CORALS.

Y. *Streptelasma*, sp.

This coral bears some resemblance to *S. æquisulcatum*, M'Coy, sp., of the Valentian and Salopian (Llandovery and Wenlock) of England and Scotland. The same form occurs at Moonee Ponds Creek.

GRAPTOLITES.

Y. *Monograptus*, spp.

The dozen or more examples in the Spry collection at the National Museum may be provisionally referred to two types, which bear certain resemblances in the shape and width of the thecæ to *M. concinnus*, Lapw., and *M. cyphus*, Lapw., both of which species occur in the Lower Valentian (Birkhill shales) of Scotland.

CRINOIDS.

Y. *Hapalocrinus victoriae*, Bather.

Ref.—Bather ('97), p. 337, pl. XV.

Type specimen found close to the Old Pumping Station, near Brander's Ferry.

STAR-FISHES.

Y. *Palæaster smythi*, M'Coy sp.

Ref.—M'Coy ('74), p. 41, pl. X., fig. 1.

Both this and the following species found near the Old Pumping Station, and also in the sandstone of Moonee Ponds Creek.

Y. *Palæaster meridionalis*, Eth. fil.

Ref.—R. Etheridge, jun. ('91), p. 199, pl. XXX.

BRITTLE-STARs.

Y. *Gregoriura spryi*, Chapm.

Ref.—Chapman ('07), p. 25, pl. VI., fig. 1; pl. VIII., figs. 1, 3. Genotype found near the Botanical Bridge.

VERMES.

Y. D. *Trachyderma crassituba*, Chapm.

Ref.—Chapman ('10), p. 103, pl. XXVII., figs. 1-4.

One of the commonest fossils at South Yarra. Also found in the dark blue indurated shale near Moonee Ponds Racecourse.

BRACHIOPODA.

Y. *Lingula spryi*, Chapm.

Ref.—Chapman ('03²), p. 64, pl. X., figs. 9, 9a.

Also found in the Swanston-street sewerage works.

Y. *Lingula yarraensis*, Chapm.

Ref.—Chapman ('03²), p. 65, pl. X., figs. 10, 10a. Figured and described under the name of *L. latior* (non M'Coy). Afterwards changed (*nom. mut.*) to *L. yarraensis*, Chapm. ('05), p. 19.

Y. D. *Siphonotreta australis*, Chapm.

Ref.—Chapman ('03²), p. 65, pl. X., figs. 7, 8, 13; pl. XI., fig. 1.

Found also in Swanston-street.

Y. *Craniella lata*, Chapm.

Ref.—Chapman ('03²), p. 68, pl. X., figs. 4, 14.

Y. D. *Chonetes melbournensis*, Chapm.

Ref.—Chapman ('03²), p. 74, pl. XI., figs. 2-4.

One of the most widely distributed of the Silurian fossils of the Melbourne area. Other localities are Merri Creek, Studley Park, Balwyn, near Templestowe, Yan Yean, and Broadhurst's Creek near Kilmore.

Y. *Strophomena* (?) *pecten*, L., sp.

Y. *Plectambonites*, sp.

Y. D. *Orthis elegantula*, Dalman.

A cosmopolitan species. A well-known Silurian fossil in the British Islands, the Island of Gotland, Russia, Bohemia, United States, &c. In Victoria it also occurs at Fraser's Creek, Springfield.

Y. *Camarotoechia decemplicata*, Sow., sp.

Ref.—M'Coy ('77), "*Rhynchonella*," p. 26, pl. XLVII., fig. 4.

Found also in the Upper Llandovery of England. Other localities in Victoria are Richmond, Moonee Ponds Creek, Yan Yean, and Kilmore, in the Melbournian; and the Upper Yarra district, in the Yeringian series.

Y. *Rhynchotrema formosa*, J. Hall, sp.

Ref.—M'Coy ('77), "*Liopleura*," p. 22, pl. XLVI., fig. 6.

Also typical of the Lower Helderbergian (Upper Silurian) of North America. Another locality in Victoria is near Mt. Disappointment.

Y. *Dielasma*, sp.

Y. D. *Nucleospira australis*, M'Coy.

Ref.—M'Coy ('77), p. 27, pl. XLVII., figs. 7, 8.

Other localities are Swanston-street, Jolimont, Merri Creek, and Broadhurst's Creek.

PELECYPODA (BIVALVES).

Y. *Grammysia abbreviata*, Chapm.

Ref.—Chapman ('08), p. 14, pl. I, fig. 2.

Also in the Yeringian series, south of Mansfield.

Y. *Palawanatina*, cf. *solenoides*, J. Hall.

Ref.—Chapman ('08), p. 18, pl. I., fig. 6.

Y. D. *Edmondia perobliqua*, Chapm.

Ref.—Chapman ('08), p. 18, pl. I., figs. 7-9.

A moderately common fossil, and apparently restricted to the locality.

Y. *Cardiola cornucopiae*, Goldfuss, sp.

Ref.—Chapman ('08), p. 20, pl. I., figs. 11, 12.

An interesting species on account of its wide distribution. Found in Great Britain, from the Llandeilo (Upper Ordovician) to the Upper Ludlow (Upper Silurian) beds. The British specimens are recorded under the name of *C. interrupta*, Sowerby, but the specific name given here has priority. In Victoria this species is also found at Moonee Ponds Creek.

Y. *Ctenodonta portlocki*, Chapm.

Ref.—Chapman ('08), p. 24, pl. II., figs. 17-20.

This species has also been found in the Yeringian series near Lilydale.

Y. *Nuculites coarctatus*, Phillips, sp.

Ref.—Chapman ('08), p. 26, pl. II., figs. 24, 25.

The shells of this genus are readily distinguished from other *Nuculacea* by having an anterior buttress or muscle-support on the internal surface of the shell, seen in the casts as a distinct slit. *Cucullella*, often referred to on the old geological quarter sheets, is a generic synonym. *N. coarctatus* also occurs near Mt. Disappointment.

Y. *Nuculites maccoyianus*, Chapm.

Ref.—Chapman ('08), p. 25, pl. II., figs. 21-23.

Also found at Merri Creek and Yan Yean.

Y. D. *Nucula melbournensis*, Chapm.

Ref.—Chapman ('08), p. 28, pl. II., figs. 29-33.

One of the commonest of the Silurian bivalves, and practically confined to the Melbourne area.

D. *Nucula arcæformis*, Chapm.

Ref.—Chapman ('08), p. 30, pl. II., fig. 36.

Y. *Nucula taylori*, Chapm.

Ref.—Chapman ('08), p. 30, pl. II., figs. 37, 38.

Also found at Broadhurst's Creek, near Kilmore.

Y. *Nucula opima*, J. Hall, sp., var. *australis*, Chapm.

Ref.—Chapman ('08), p. 31, pl. III., figs. 39-43.

Also at Yan Yean.

Y. D. *Palæoneilo victoriae*, Chapm.

Ref.—Chapman ('08), p. 33, pl. III., figs. 47-49.

An ornate form, often showing the remarkable toothed,

taxodont hinge, and frequently with both valves extended, attached along the hinge-line. This species occurs also at Moonee Ponds Creek, Anderson's Creek, Broadhurst's Creek, and Fraser's Creek.

Y. *Palæoneilo spectabilis*, Chapm.

Ref.—Chapman ('08), p. 35, pl. III., figs. 51, 52.

Occurs also at Jolimont.

Y. D. *Palæoneilo producta*, Chapm.

Ref.—Chapman ('08), p. 36, pl. III., figs. 53, 53A.

Found also at Kilmore.

Y. *Palæoneilo* (?) *constricta*, Conrad, sp.

Ref.—Chapman ('08), p. 36, pl. III., fig. 54.

Y. *Parallelodon æqualis*, Chapm.

Ref.—Chapman ('08), p. 39, pl. IV., fig. 57.

Y. (?) *Pterinea tenuistriata*, M'Coy.

Ref.—Chapman ('08), p. 41, pl. IV., fig. 61.

This species occurs in the Wenlock and Ludlow series in England.

D. *Conocardium* (?) *costatum*, Cresswell, sp.

Ref.—Chapman ('08), p. 45.

Typical specimens occur in the Yeringian limestone of Cave Hill, Lilydale.

Y. *Aviculopecten spryi*, Chapm.

Ref.—Chapman ('08), p. 49, pl. V., fig. 75.

Y. *Modiolopsis melbournensis*, Chapm.

Ref.—Chapman ('08), p. 50, pl. V., figs. 76, 76a.

Y. *Modiolopsis complanata*, Sow., sp.

Ref.—Chapman ('08), p. 50, pl. V., fig. 77.

Several examples of this striking form have been found. Its occurrence here is especially interesting from the fact that it is also found in Great Britain, in rocks ranging from the Wenlock to the Downtonian (Upper Silurian).

D. *Modiolopsis nasuta*, Conrad, sp., var. *australis*, Chapm.

Ref.—Chapman ('08), p. 51, pl. VI., fig. 78.

Y. *Goniophora*, cf. *glaucus*, J. Hall, sp.

Ref.—Chapman ('08), p. 53, pl. VI., fig. 81.

GASTEROPODA.

Y. *Bellerophon*, sp.

Y. *Cyrtolites*, sp.

PTEROPODA.

Y. *Coleolus* (?) *aciculum*, J. Hall.

Ref.—Chapman ('04), p. 339, pl. XXXI., fig. 7.

Y. D. *Hyolithes spryi*, Chapm.

Ref.—Chapman ('04), p. 340, pl. XXXI., fig. 9.

This species has also occurred in the shales from the telephone tunnels in Swanston-street, Melbourne.

Y. *Conularia ornatissima*, Chapm.

Ref.—Chapman ('04), p. 341, pl. XXXI., figs. 13, 14.

CEPHALOPODA.

Y. D. *Orthoceras*, sp.

Y. D. *Protobactrites*, sp.

Y. D. *Cycloceras bullatum*, Sowerby, sp.

Ref.—M'Coy ('79), p. 26, pl. LVII., fig. 4.

This species was originally identified by M'Coy in mudstone from a cutting at Johnston-street, Collingwood, and in sandy beds from hills in the township of Whittlesea. Its range in Britain is from the Upper Llandovery to Upper Ludlow.

Y. *Dawsonoceras*, sp.

Y. *Kionoceras*, sp.

Y. *Ooceras*, sp.

TRILOBITA.

Y. *Cyphaspis spryi*, Gregory.

Ref.—Gregory ('01), p. 179, pl. XXII.

The type specimen was found by Mr. Spry in yellow mudstone about two chains east of the Botanical Bridge, South Yarra.

Y. D. *Encrinurus*, sp.

Y. *Odontopleura bowningensis*, Eth. fil. and Mitch.

Ref.—Etheridge and Mitchell ('97), p. 696, pl. L., figs. 1-3 ; pl. LII., fig. 5.

This species was originally described from the Bowning series (Lower Trilobite bed), of Bowning Creek, N.S.W.

Y. *Homalonotus harrisoni*, M'Coy.

Ref.—M'Coy ('76), p. 19, pl. XXIII., fig. 11.

Also found at Moonee Ponds Creek.

Y. *Proetus*, sp.

Y. *Ampyx*, sp.

CIRRIPIEDIA.

Y. *Turrilepas ornatus*, Chapm.

Ref.—Chapman ('10), p. 106, pl. XXVIII., fig. 1 ; pl. XXIX., fig. 2.

An extinct form of barnacle, having a conical body covered with overlapping plume-like plates, generally with a median fold. This species is also found in beds of the same age at Yan Yean.

PHYLLOCARIDA.

Y.—*Ceratiocaris pinguis*, Chapm.

Ref.—Chapman ('10), p. 107, pl. XXVIII., figs. 3-5.

Y. *Ceratiocaris*, cf. *pardoeana*, Jones and Woodward.

Ref.—Chapman ('10), p. 109, pl. XXVIII., fig. 6.

Y. *Xiphidiocaris falcata*, Chapm.

Ref.—Chapman ('10), p. 110, pl. XXVIII., figs. 7, 7a-d.

EURYPTERIDA.

Y. D. *Pterygotus australis*, M'Coy.

Ref.—M'Coy ('99), p. 193, text-figure.

Since the discovery of the original type (fragment of a somite),

numerous pieces, both of the carapace and the jointed appendages, have been found in the shales of South Yarra. The characteristic scaly surface of the body and base of the appendages renders fragments of this fossil easily distinguished.

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MIXED POLLEN COLLECTED BY BEES.

BY A. D. HARDY, F.L.S.

(Read before the Field Naturalists' Club of Victoria, 13th June, 1910.)

THE November (1909) issue of the *Journal of the Department of Agriculture*, Victoria, contained a lecture by Mr. R. Beuhne, the president and technical secretary of the Victorian Apiarists' Association, entitled "Bees and Fruit Fertilization." Amongst other matters of interest, one which particularly arrested my attention was that to which the following quotation refers:—"It is, however, a well-known fact that a bee during each trip confines itself to one species of plant, whether in search of nectar or pollen, and a mixture of pollen is never found in any bee's load as it enters the hive; plants of the same species but of different varieties are, however, worked on the same trip." I take it that this remark was made after observation on the field work of bees, but that the pollen was subjected to macroscopic examination only, the colour of the collection being the main guide. Mr. Beuhne presumably referred to the domesticated bee (*Apis mellifica*), in which case the statement may hold good as a general rule. There are, however, exceptions, and with one or two such instances this paper is mainly concerned.

First allow me to quote a few authorities wholly or partly in support of Mr. Beuhne's remark. Professor A. J. Cook, of Pomona College, Claremont, California (late Professor of Entomology, Michigan State Agricultural College), says:—"It is a curious fact, noted even by Aristotle, that the bees during any trip almost always gather only from one species or bloom. From this fact we see why bees cause no intercrossing of species of plants. They only mix the pollen of different plants of the same species." The constancy of the bee in its attention to the bloom of one species during an outing from the hive has often been referred to, but there are, I think, fewer, if any, references to the collection of pollen by native bees. Having frequently observed imported bees visiting unlike flowers in search of nectar or pollen (or at times both), I caught some which had been visiting distinct species of plants while gathering pollen exclusively. Most of these had homogeneous pollen in their baskets, and one which was taken in the act of removing pollen from a yellow-centred white dahlia had gathered from this form only, notwithstanding its having just previously settled on such unlike flowers as purplish petunias, red and white roses, &c. I am not dealing with pollen adhering accidentally (as far as the bees' seeming intentions are concerned) to hairs on various parts of the body, but to the deliberate collection of grains by means of the baskets. In the pollen masses of several I found that, while one form of pollen grain predominated, grains of other species were to be found—*e.g.*,

one bee taken from a red hollyhock, at Kew, had at least four kinds of grains, including representatives of two species of composite flowers—gaillardia and chrysanthemum.

Samples of the stomach contents of two diseased hive bees were given me by Mr. Price, of the Victorian Department of Agriculture—one from New Zealand, the other from the Grampians district, Victoria. The latter proved to have a homogeneous collection of pollen from eucalyptus blooms, but the New Zealand sample contained seven sorts of pollen, shown in the accompanying drawing (plate vii.), though one form predominated and the sixth and seventh were scarce.

In the case of a native Victorian bee which Mr. F. Spry, of the National Museum, Melbourne, had provided, and identified as *Nomia metallica*, there were in one-quarter of the pollen mass at least eleven forms of grains, the supply having been drawn not only from different species, but in several instances from families phylogenetically remote. (See plate vi., in which, as in plate vii., the grains are numbered in their order of frequency.)

Knuth states, in "Handbook of Flower Pollination," p. 146, that "Pollen-balls consist of only a single species." I am at a loss to know whether this remark by the chief authority, since Mueller, on the subject of flower pollination, is to be read as an exact statement of fact or as a broad rule to which the usual exceptions are to be understood. Knuth does not for a moment leave us in doubt as to the bee *visiting* various species of plants during one trip. On the contrary, many examples are given, but these are mainly to illustrate the carrying of mixed pollen on parts of the body other than the collecting baskets, and obtained, during a search for nectar, more by accident than design. Kerner,* too, remarks that—"Insects certainly show preference for a single species for considerable periods, particularly when the species is flowering in quantity on a confined space. Still, anyone who closely observes insects visiting flowers can easily convince himself that the flowers visited are changed from time to time," &c. Here again is probably a collection of a by-product, as it were, and not the deliberate collection of the pollen into the collecting baskets. It is generally admitted, I think, that pollen and nectar may be collected by a bee during a single trip from the hive. Langstroth† states "that if a few pollen-gatherers be dissected when honey is in plenty the honey sacs will ordinarily be full."

From six bees captured on alighting at a hive at Mr. Beuhne's Tooborac Apiary, I obtained only one form of grain on dissecting, and these insects had come home from various points of the compass. The grains were collected from the eucalyptus trees (*E. goniocalyx*) the only high level bloom available at a time

* "Nat. Hist. Plants," vol. ii., p. 403.

† "The Hive and the Honey Bee," p. 119.

when other blooms were scarce, while in the case of three specimens of "bee-bread" taken from hives of the same apiary soon after, two yielded homogeneous eucalyptus pollen only, and the third, composed chiefly of the ornate spheroidal grains of *Hypochaeris radicata* or "False Dandelion," contained also the angular grains of the above-named eucalypt. My conclusion is, therefore, that although bees deliberately collect pollen from one species when the flowers are in considerable quantity within easy flight distance, they collect from various species when the first favoured flower is not abundant or is scattered amongst other blooms equally attractive, and that mixed pollen is gathered by cleansing the body and limbs after exploiting various species for nectar; that pollen is at times deliberately taken from flowers of both high and low level and irrespective of colour and perfume; and that the examination of two native bees seems to indicate that the wild bees are less constant than the domesticated insects, owing probably to the artificial location of hives of the latter in areas where usually there is a profusion of native flowers of one kind or where plantations of a single species have been made.

That the hybridization of eucalyptus trees vouched for by Mr. J. H. Maiden, F.L.S., has been caused by native bees is to me a theory easily conceived. There is room for further inquiry in this direction, and the foregoing notes are offered in the hope that the subject may receive attention from other members of the club, especially members situated favourably for the observation of native bees and plants.

REFERENCE TO PLATES.

Plate vi.—Figs. 1, 2, 3, 4, 5, 7, 10—sections: 1, Myrtaceæ (Eucalyptus); 6 and 7, Compositæ; 8, Passifloreæ; 9, Epacrideæ. \times about 900.

Plate vii.—Figs. 1B, 3, 6, and 7—sections: 2, Compositæ; 3, Myrtaceæ; 4, Epacrideæ. \times about 1,000.

THE PHYSICAL HISTORY OF THE PLENTY RIVER.—In the recently issued volume of the *Proceedings of the Royal Society of Victoria* (vol. xxii., N.S., p. 12), Mr. J. T. Jutson contributes an interesting article on "The Physical History of the Plenty River." As the valley of the Plenty has been visited by excursion parties of the Field Naturalists' Club at various points, the article is particularly interesting. Mr. Jutson, in his conclusions, indicates that the present stream is comparatively new, and that an older Plenty occupied the position now filled by the basalt sheet commencing at South Yan Yean and trending south-westerly into the valley of the Darebin Creek, and junctioning with the old Yarra and old Merri Creek about the present position of Clifton Hill. A second portion of his article deals with an interesting case of stream capture at Warrandyte.

BOOKS, &c.

A HANDBOOK OF THE BIRDS OF TASMANIA AND ITS DEPENDENCIES. By Frank M. Littler, F.E.S. 242 + xviii. pp., with 50 plates. 4s. 1910. Launceston: Published by the Author.

Seeing that many Victorian birds occur also in Tasmania, this handbook of the birds of the island State will prove a useful addition to the library of Victorian ornithologists. The author is to be congratulated on the clear and concise plan adopted for recording the various species, which is on the following system:—Male, Female, Young, Nest, Eggs, Breeding Season, Geographical Distribution, and Observations. He has taken the opportunity to quote the latest *Tasmanian Game Protection Act*, and gives a complete list of the species protected under it, and, so that there need be no excuse for ignorance of the fact, an asterisk is placed at the commencement of each article dealing with a protected bird. Another useful feature, which authors of similar works often omit, is the systematic index, which also includes the vernacular names. These latter are again indexed alphabetically at the end of the volume. Mr. Littler reckons the number of absolutely authenticated species for Tasmania and the islands, including accidentals, casuals, and migrants, at slightly over 200, of which rather more than half are permanent residents, while 21 of these are “peculiar” or insular forms. It may be remarked that the resident birds of Tasmania show marked melanistic tendencies as compared with those of the Australian mainland, whilst it is also noticeable that of the species “peculiar” to the island all, except the Lesser White-backed Magpie, *Gymnorhina hyperleuca*, are larger than their nearest allies on the mainland. The illustrations are a prominent feature of the work. Though several from the cameras of Messrs. Campbell, Mattingley, &c., have already appeared in *The Emu*, the majority have been taken specially for the handbook. Those contributed by Mr. H. C. Thompson are particularly good, and embrace some beautiful subjects. The Dusky Fantail on Nest, The Nest and Young of Grey Butcher-bird, Nest of New Holland Honey-eater, and Nest of Black-headed Honey-eater may be mentioned as good examples of this observer’s work. The volume has been printed by Walker, May and Co., and leaves nothing to be desired from a typographical point of view. The observations are naturally the most interesting portion of the work, and contain in a few sentences a vast amount of information. Taken altogether the volume is one which will be found extremely useful by bird-lovers both in Tasmania and in the other Australian States.

GEOLOGICAL SURVEY PUBLICATIONS.—The Mines Department, Victoria, has recently issued two publications of great interest, one being Bulletin No. 23—“Biographical Sketch of the

Founders of the Geological Survey of Victoria" (with portraits), by E. J. Dunn, F.G.S., Director, with Bibliography by D. J. Mahony, M.Sc., F.G.S.; the other being Memoirs No. 9, "The Geology of the Camperdown and Mount Elephant Districts, Western Victoria," by H. J. Grayson, Geological Laboratory, Melbourne University, and D. J. Mahony, M.Sc., F.G.S.

In the former Mr. E. J. Dunn has rendered a valuable service in briefly recording the official life of the various persons who helped to make the old geological survey of Victoria one of the most famous in the world. Mr. A. R. C. Selwyn, the founder of the survey, did yeoman service for Victoria, traversing it in the early days from end to end, and laying down such a sure foundation that later geologists have had little to undo. One need only glance at the list of his reports and maps to see what a great man he was. Perhaps no country in the world had such master minds working in it at the same time as Victoria had in the sixties, when Selwyn, Mueller, and M'Coy were busy smoothing the paths of their successors. The other men dealt with by Mr. Dunn are Richard Daintree, Christopher D'O. H. Aplin, Norman Taylor, G. H. F. Ulrich, C. S. Wilkinson, R. A. F. Murray, H. Y. L. Brown, R. Etheridge, jun., C. S. Wood, and J. Cosmo Newbery. Mr. Mahony's share of the bulletin has been no light work—for instance, Selwyn's publications require seven pages to list them, while Murray's extend to over nine pages. The bulletin will save future workers many weary hours of search should they require information on any particular district.

In the second publication under notice, which is descriptive of the Geological Quarter-sheet Maps, No. 8 N.E. and 17 S.E. (new series), published some time ago, Messrs. Grayson and Mahony have done equally good work. The area dealt with is almost in the centre of the great basaltic area of Western Victoria which covers some 9,000 square miles, and with the exception of the Snake River Plains in the United States, and the Deccan Plateau in India, is the largest similar area in the world. It is unfortunate that a locality plan was not included in the memoir, so that the reader could follow the writers' remarks in the absence of the Quarter Sheets, which have not been sent out with it. The area is an interesting one, seeing that it contains a number of the so-called "crater lakes," the mode of origin of which has been a debatable point. Lists of the fossils and foraminifera met with are given, and full petrographical notes, with a list of the minerals. The memoir is well illustrated with plates detailing various features and many fine micro-sections of the various basalts, &c.

A COURSE of eighteen University Extension lectures on "The Bacteriology of Everyday Life" will be commenced by Dr. R. J. Bull at the University on Wednesday evening, 10th August. Tickets for the series, one guinea.

THE DESTRUCTION OF BIRDS.—Too much notice cannot be drawn to the frightful destruction of birds going on everywhere for the sake of their plumage to satisfy the whims of fashion. Mr. J. W. Mellor, of Adelaide, in the last number of the *Emu*, quotes a number of statements made in an address to the Royal Society of Arts (England) by Mr. James Buckland, the promoter of the Plumage Bill. It appears that in Venezuela in 1898 over 1½ millions of White Herons were killed for the sake of their plumes; ten years later the birds had become so scarce that only a quarter of a million could be obtained. Another bird of that country has been seized upon by fashion, the large quills from the tail and wings of the Jabiru or Giant Stork being in great demand, and 28,250 quills were catalogued at a London plume sale. How many birds were destroyed to obtain these is hard to say, but, doubtless, several thousands. Venezuela seems to be a happy hunting ground for bird vandals, for the British Consul at Ciudad Bolivar reports that during 1908 nearly five tons of feathers were exported for millinery purposes. The American Flamingo has also come under the notice of the bird-hunters, and the interesting description Mr. F. M. Chapman, of the New York Natural History Museum, wrote in 1904 of their breeding-habits on one of the outer Bahama Islands has almost led to their extermination. Fortunately the situation was recognized in time, and they have had a certain amount of protection awarded to them. Numerous other instances are quoted of birds which are becoming scarce solely owing to their market value as furnishers of bright plumage suitable for ladies' hats. Although the Humming-bird is protected by law throughout Great Britain's possessions in the West Indies, no less than 25,000 skins have been catalogued at recent London sales, where the prices realized were from 1d. to 1½d. per skin. Mr. Buckland says the eye of the plume-hunter is on Australian birds. Recently 490 emus were killed at a single drive in Queensland, and 419 were smuggled out of Australia and sold in the London sale-rooms on 4th August last. In 1907 Lyre-bird tails to the number of 180 were sold in London. The brilliant Rifle-bird and the handsome Regent-bird are fast disappearing to please the whims of fashion. Let us hope that the proposed bill will be able to save the lives of some of our feathered beauties. Why cannot the ladies be content with ostrich plumes, the production of which is unaccompanied by taking of life?

THE GEOLOGY OF MELBOURNE.—A series of University Extension lectures under this title has been arranged to be delivered by Mr. G. B. Pritchard, B.Sc., F.G.S., commencing on Friday, 5th August, at 8 p.m., at Bradshaw's Business College, opposite the Flinders-street station. Copies of the syllabus can be obtained from the hon. secretary, Mr. V. R. M'Nab, Working Men's College. The fee has been fixed at ten shillings for the series of ten lectures and two field excursions.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 8th August, 1910.

The president, Mr. F. Wisewould, occupied the chair, and about 75 visitors and members were present.

The president announced that Dr. Danés, of the Geological Department of the Bohemian University of Prague, was present, and extended to him a warm welcome on behalf of members. Dr. Danés, who was passing through Victoria on his way from Queensland, bowed his acknowledgments, and remained for the conversazione after the business of the meeting.

CORRESPONDENCE.

From the New South Wales branch of the "Wattle-Day League," with printed leaflets of information Nos. 1 and 2 attached, the hon. secretary, Mrs. J. W. Kettlewell, inviting the Club to inaugurate a Victorian branch. Mr. J. Shephard remarked that such a step as had been proposed would, in his opinion, lead to greater destruction of wattle than at present, and it was bad enough now. The letter was formally received, and the matter left to the committee for consideration.

REPORT.

A report of the Junior excursion to the Botanical Laboratory, University, on Saturday, 6th August, was, in the absence of the leader, Miss White, D.Sc., given by Mr. C. Stout, hon. secretary for Juniors, who stated that about twenty juniors were present, the day being somewhat inclement; however, a pleasant and instructive afternoon had been spent. Miss White had explained the processes of flower pollination, and had exhibited a large series of seeds and fruits from various countries.

ELECTION OF MEMBERS.

On a ballot being taken, Miss E. Gill, Bank-street, Box Hill, and Mr. T. Luxton, jun., 46 Claremont-avenue, Malvern, were duly elected ordinary members, and Mr. F. J. Thomas, Lindenow, a country member of the Club.

GENERAL BUSINESS.

The hon. secretary drew attention to an error in the programme of excursions for 1910-11, where the date of the exhibition of wild flowers was given as 3rd October, instead of which it is proposed that the exhibition be held on Monday evening, 10th October next, and continued on the following afternoon and evening.

PAPERS.

1. By Prof. A. J. Ewart, D.Sc., entitled "The Flora of the Victorian Alps," with Botanical Report by Mr. J. W. Audas.

The author called attention to the more frequent orders among the alpine plants, and briefly summarized the work previously done. He stated that the objects of the trip were an examination of the economic plants of the locality about Bright and Harrietville, and southerly to Mt. St. Bernard, and an investigation into the spread of the introduced weed, "St. John's Wort." Prof. Ewart took the opportunity to again remind members of the advantage of consulting the National Herbarium before recording names of plants in scientific publications, and gave instances of misnomers which had got into print in connection with the flora of the Alps and the Grampians.

Mr. J. W. Audas then read some notes concerning the more interesting plants collected during the trip.

In the discussion which followed, Mr. D. McAlpine remarked that the paper was a comprehensive one, but that the author had omitted any reference to fungi, lichens, and mosses. Mr. F. Pitcher thought that the tendency was to visit the alpine country at certain times only, and even then only plants which, through flowering, caught the eye, were recorded, and that a survey of such an area would require the seasonal gaps to be filled in. This was, he thought, the cause of many plants being omitted from earlier lists. The list as now augmented and brought up to date was an interesting and welcome one. Mr. A. D. Hardy noticed that *Acacia pravissima* was described as "the Ovens or Alpine Acacia," and reminded members that he had found a small grove of it growing luxuriantly about 12 or 15 feet high on the Buxton road, Acheron Valley, and also referred to the great confusion of Victorian eucalypts. *E. Sieberiana*, called Mountain Ash, for instance, was more widely known as "Gum-top" or "Silver-top Ironbark"; but there was confusion amongst the scientific as well as the common names of these important trees.

Prof. Ewart replied that his quest had been for flowering plants, and this had taken all their time; but that on a future occasion any enthusiastic student of the cryptogamic flora would be welcomed as a member of the party, and that there was at present a strong effort being made to reduce the chaotic state of the genus *Eucalyptus* to something less bewildering.

2. By Mr. R. W. Armitage, entitled "Notes on the Country about West Essendon."

The author gave a brief outline of his paper, which dealt with the different geological features adjacent to the Horseshoe Bend at West Essendon, and exhibited some fine rock sections under the microscope in illustration of his remarks.

3. By Mr. D. McAlpine, entitled "The Romance of Plant Pathology."

The author humorously described errors which had been made in the investigation of certain plant diseases, parasitic plants, &c., and in correcting these errors imparted much useful information regarding occurrences which have greatly troubled the lay mind.

EXHIBITS.

By Mr. R. W. Armitage. — Photo-micrographs and rock-sections of basalts, quartzite, and greywacke in illustration of paper.

By Prof. Ewart, D.Sc., and Mr. J. W. Audas.—Dried specimens in illustration of paper—*Acacia alpina*; *Banksia integrifolia* and *B. marginata*, showing how these two species can be confused under superficial examination; *Epacris paludosa*, wrongly determined by C. Walter and others as *E. mucronulata*; *E. paludosa* (type specimen); *Eucalyptus stellulata*, *Grevillea Victoriae*, *Helichrysum baccharoides*, *H. rosmarinifolium*, *Hibbertia obtusifolia*, *Monotoca scoparia*, and *Scleranthus biflorus*, all in flower; *Kunzea Muelleri* and *Eucalyptus stellulata*, in fruit; and *Westringia senifolia*, endemic to Victoria, and peculiar to the district.

By Mr. C. J. Gabriel.—Marine Shells.—Sixteen species of genus *Chlamys* from various parts of the world, including *C. clavatus*, *myalinus*, *testæ*, *pusio*, *bruei*, *flexuosus*, and *parvus*, Mediterranean and islands; *C. similis*, Loch Fyne; *C. vitreus*, Norway; *C. tigrinus*, Ireland; *C. imbricatus*, West Indies; *C. circularis*, Florida; *C. histrionicus*, Ceylon; *C. spectabilis*, Japan; and *C. inæquivalvis* and *C. Smithi*, Mauritius.

By Mr. A. D. Hardy, F.L.S.—Freshwater algæ from small marshy pool at Cheltenham—*Micrasterias mahabuleshwariensis*, Hobs.; *M. sol* (Ehren.), Kutz; and *Cosmarium tetraophthalmum* Bréb.

By Mr. D. McAlpine.—Flour with red streaks; culture on gelatin of *Bacillus prodigiosus*; ear-cockle of wheat; corn cockle; black rust of wheat and oats; specimen of *Cordyceps*; and rat-tailed larva of drone or bee-fly, in illustration of paper.

By Mr. J. G. O'Donohue.—Fruit of Murray Cypress, or Pine, *Callitris verrucosa*, from Werribee Gorge, Bacchus Marsh.

After the usual conversazione the meeting terminated.

WATTLE-DAY LEAGUE.—A gathering to inaugurate a Victorian branch of the Wattle-Day League is announced to be held at the Temple of the Winds, Botanic Gardens, on Saturday afternoon, 10th September.

EXCURSION — TOORAK TO RICHMOND PARK AND HAWTHORN.

A PARTY of about fifteen members was favoured with beautiful weather for the excursion from Toorak to Richmond Park on Saturday, 11th June. The main object of the outing was a study of physiography, and the country between lends itself admirably for this purpose. A start was made from the Toorak tram terminus eastward along Toorak-road, and from a high point at the intersection of Glenferrie-road a very fair view was obtained of the surrounding country. Looking towards Glenferrie, on the right we had a fine view of the Dandenong Ranges. The view on our left was, unfortunately, obscured by a thick haze, but in front we saw a beautiful stretch of hills and dales away to Glenferrie and Hawthorn. Here we pictured Victoria through the varying changes she has undergone, from the long-ago ages of her folded mountains, through that period of sculpturing when these great elevations were eaten down by rivers to pene-plains, thence to a great subsidence, when the sea floor near the coast became covered by shore or estuarine deposits. After this came an uplift of the earth's crust, and this enabled rivers to begin work afresh, and to carve up this coastal plain into ridges and valleys. What do we see now? A splendid example of a dissected coastal plain, traversed by what we may call "switchback" roads. After a considerable descent our next stop was at the Glen Iris railway line crossing, near Kooyong station. In the distance we saw the beginning of canyon formation, which was briefly dealt with. The main point of interest here was, however, the valley of Gardiner's Creek—a fine, broad, almost flat-bottomed, sheet of alluvium. The very level floor of this valley would lead one to think that in the past this portion was a shallow lake or marsh, formed, probably, by the blocking up of the mouth of the stream, which later on filled up this lake with deposits of silt. The reason why Gardiner's Creek has no basalt in its valley was discussed. It was suggested that this creek owed its freedom from basalt to the fact that its bed was at a higher level at the time when the volcanic flows came than other streams containing lava, but it has since cut down very much, and at its junction with the Yarra near Heyington station is now only about three feet above sea-level. Dr. T. S. Hall, in his interesting little book, "Hill and Dale," deals fully with Gardiner's Creek. The Geological Survey map, No. 1, S.E., shows a number of meanders between Glenferrie-road and the river, but during recent years these have become silted up, and a straighter course has been artificially made.

We next journeyed along the railway line to the cutting at Heyington station, and found some exceedingly interesting

PLATE VIII.



CONTORTED ROCKS, RAILWAY CUTTING. HEYINGTON.

features in this splendid geological section of Silurian sandstones and shales. The crushing that has gone on here must have been enormous, for the strata are crumpled in all directions, and the whole section is made up of faults, dykes, anticlines, synclines, &c. Perhaps the most striking is a very fine monocline. The pressure must have been intense, for the layers are in places bent at right angles. The colouration of the clayey layers in it is splendid, from the most delicate pink through to the reds, browns, and yellows, a fine illustration of the effect of iron, Nature's great colouring agent. Owing to the difficulty of getting the right position, my photographs do not by any means convey a good idea of this remarkable monocline. As we approached Heyington station a fine Blue Crane was disturbed, and flew across the river.

Leaving the cutting and passing Heyington station, we were able to study a fine meander of the River Yarra. Here we noticed that the left bank was steep and high, while the other was low, with a gentle slope. This is the result of the volcanic flows before-mentioned, which filled up the old valley of the Yarra, and forced the river to seek a new valley for itself. This it did by working its way into the softer sedimentary rocks at their junction with the hard basalt. We were able to make a good comparison between the two formations, for, while the sandstone surface was carved into ridges and valleys by the eroding action of running water, and bearing rather a scanty growth of pasture, the lava plain was almost level, with a fine thick growth of excellent grass. Our path then led to the railway bridge over the river, from which, looking down stream, we saw some very good examples of how lakes may be formed behind raised flood plains by tributaries running at right angles to the main stream.

Crossing the bridge into Richmond Park, we wended our way round the Burnley Horticultural Gardens, and noted some "billabongs" along the Yarra. We then recrossed the river by the Swan-street bridge, our objective being the now disused basalt quarry in Morang-road, Hawthorn. This is a feature of much interest, as it is one of the few places where the basalt is found on the left side of the Yarra. The occurrence is explained as follows:—The bed of Hawthorn Creek (a small tributary of the old Yarra) was not elevated enough to prevent the lava flow from entering its valley, so it was filled up. This formed, as it were, an arm, or off-shoot, from the main body of the molten material. It followed up the valley of this creek for a considerable distance, and is shown on the Geological Survey map to extend as far north as Denham-street, and, when the sewerage contracts were in progress, was traced eastwards nearly to Elgin-street. Evidences in the quarry

prove there were two flows, the material composing which is of a particularly dense nature, and has a very metallic ring. One portion of the floor cooled in a somewhat nodular manner, while another shows columnar structure fairly. Included in the dense basalt were found pockets filled with scoriaceous material, which seems to show that this had been picked up by the flow while it moved along. This was the concluding item in a pleasant afternoon's outing.—J. SIDNEY KITSON.

A.A.A.S.—The next meeting of the Australasian Association for the Advancement of Science will be held in Sydney from the 9th to 14th of January next. Intending members should communicate with the hon. secretary for Victoria, Dr. T. S. Hall, M.A., University, Carlton.

“THE GEOLOGY OF NEW ZEALAND.”—Messrs. Whitcomb and Tombs Ltd., of Christchurch, have added another volume to their excellent series of scientific publications in “The Geology of New Zealand,” by Prof. James Park, of the University of Otago. The work extends to nearly 500 pages, and is well illustrated, there being a geologically coloured map of New Zealand, sixteen full-page plates (principally of fossils), and about 150 smaller maps and text illustrations. Besides structural and economic geology, the history of the geological survey and the work done by the early observers is fully dealt with. Speaking of the general geological structure of New Zealand, the author says that, though so small in area, the geological record of New Zealand is even more complete and varied than the neighbouring continent of Australia. It is the remnant of a submerged continent of great antiquity, and contains representatives of almost every rock formation found in the Northern Hemisphere. With its narrow limits and diminutive mass it could offer no effective resistance, and, therefore, since the beginning of geological time has always responded to vagrant impulse by rising and falling like the unresisting waves of the open sea. The gold and coal resources possessed by the Dominion are dealt with at length, and also the great variety of other minerals of economic value, the Parapara deposit of iron ore, near Nelson, being the largest deposit of iron ore in the world outside the Atlantic basin. A bibliography of about sixty pages will be of great assistance to the student, while an author's index and a very complete general index of twenty pages make up an exceedingly valuable addition to the geologies of the various portions of the Southern Hemisphere, while the cost—ten shillings and sixpence—is very reasonable in consideration of the expense of production.

NOTES ON THE COUNTRY ABOUT WEST ESSENDON.

BY R. W. ARMITAGE.

(Read before the Field Naturalists' Club of Victoria, 8th August, 1910.)

THE following contribution is an expansion of, and addition to, the report of the Club's excursion recently held at Essendon (1).

GENERAL PHYSIOGRAPHIC FEATURES.

The area under discussion has been mapped by the Geological Survey of Victoria on Quarter Sheet No. 1, N.W., Melbourne, and mainly lies in section vii., allotments 1, 2, and 3, and section viii. of the parish of Doutta Galla, and in section xx., allotment 2, of the parish of Cut-Paw-Paw.

The flat ridge along which part of the main railway line to Sydney has been laid in this locality, and which divides the valley of the Moonee Ponds Creek from that of the Saltwater River, consists of Tertiary sands, grits, and clays, mainly (as will be shown later) of Kalimnan age. These unconformably overlie small areas of ferruginous deposits of Barwonian age. Both sets of sediments rest on the eroded surface of the Older Volcanic basalt which is met with at varying depths from the surface.

The greater portion of this ridge—viz., that part which extends from near the North Melbourne station to within a mile north of the Essendon station—has never been covered by the Newer Volcanic lava flows, as its surface was at a greater elevation than would allow of the lavas covering it. Since that time denudation has steadily lowered the ridge, until now much of the area covered by the Newer Volcanic lavas is higher than the Tertiary sediments of the ridge.

The Essendon ridge shows a rather mature character in its stream development, and this is well illustrated immediately to the west of the Essendon station by a shallow and small tributary valley running in a southerly direction down towards the Saltwater River, and debouching into the swampy area at the west end of Holmes-road, Moonee Ponds. The Essendon station stands at an elevation (2) of 148 feet above sea level, on the eastern edge of this valley, the thalweg crossing Buckley-street at Lincoln-road being 70 feet above sea level, while the western edge is 127 feet in height. This valley, then, about 50 chains across, has a vertical depth of about 70 feet, with a slope of 1 in 30 on the eastern flank, and a sharper grade of 1 in 18 on the west side, thus giving the contours in cross section of a fairly mature, broadly open, concave valley. Such valleys are characteristic of those portions of the country in and about Melbourne which have never been covered by the Newer Volcanic lava flows, and show a sharp contrast with the gorges carved out in country covered by those lava flows.

Where the thalweg of this valley crosses Buckley-street, the dark-coloured clayey nature of the surface soil, combined with its manner of developing sun-cracks on drying, indicates that an Older Basalt exists immediately beneath the surface, and that the soil is, in part at least, derived from it. This indication is substantiated by the evidence procured while the sewerage of this area was in progress.

Between section viii., parish of Doutta Galla, and section xx., allotment 2, parish of Cut-Paw-Paw, the Saltwater River makes a broad, sweeping curve, known locally as the "Horse-shoe Bend," a typical river meander. The surface of the Newer Volcanic basalt on the river cliff on the north side of this meander is about 140 feet high,* while at a distance of a mile to the southward, on the opposite side of the valley, the top of the basalt plain is about 10 feet lower. This slight difference in elevation, combined with the fact that the character of the basalt is practically similar on both sides of the valley, points to the conclusion that when the lava sheet had been formed it was continuous right across what is at present the valley of the Saltwater River. The pre-existing drainage system of the country was completely obliterated by the lava floods. The surface of this lava sheet would have, in general, a fairly level character, with a gentle slope to the southward, and would be swampy. These swamps would drain by overflow to the south. Gradually drainage channels of a tortuous character would originate on the young lava plain. One of these would become dominant, having a meandering course where it slowly traversed the swampy areas. This main stream would gradually sink its channel by corrasive activity into the lava plain, retaining, on the whole, its original meanders. During the trenching of its valley, pauses in the vertically corrasive activity of the stream would occur. These cessations of activity would probably be due either to a movement of subsidence of this part of the earth's crust or to the fact that a rock-bar lower down was resisting removal by the stream's activity. During these pauses in vertical corrasion the main energies of the stream would be expended in the work of widening its valley by lateral erosion. This work would proceed sufficiently far for the river to aggrade its valley floor by the formation of alluvial flats on the insides of bends. Then, from some cause, such as an uplift of the land, or the completion, down-stream, of the removal of a rock-bar on which the river had been engaged at work, vertical corrasion would recommence, and continue until an entrenched meander had been sunk in the last-made flood-plain and also

* The heights mentioned are obtained, where possible, from Contour Plan (2). Other heights have been estimated from readings taken by aneroid, kindly lent by Professor Payne, Melbourne University.

in the underlying rock material. This sequence of events might possibly occur repeatedly, on each occasion some remnants of each flat valley-floor remaining on one or other side of the present valley at various elevations. These would constitute a series of river terraces, the oldest being situated at the highest elevation on the flanks of the valley, the younger being lower, and the most recently formed being found just above present stream level. Seven such terraces can be perceived on the south side of the Saltwater River at the Horseshoe Bend at the following elevations—viz., No. 1, 94 feet; No. 2, 64 feet; No. 3 (to be seen on both sides of the river), 40 feet; No. 4, 32 feet; No. 5, 24 feet; No. 6, 18 feet to 13 feet; No. 7, 6 feet. These are unsymmetrical terraces, being confined to the south side only (with the exception of No. 3), at the Bend, the river having corraded its bed mainly toward the north side of its valley, persistently shifting its channel to that side, with the result that the constant undercutting has caused the formation of the steep-faced river-cliff on the north of the Bend.

This successive arrival at a state of maturity and then rejuvenation, indicating alternating pauses and renewals of a river's vertically corrasive activity, as evidenced by the formation of river terraces, is so commonly to be noticed in connection with stream valleys in the vicinity of Melbourne as to point to minor oscillations in level of the earth's surface as their ultimate cause. At the present time the Saltwater River is a tidal stream, and therefore dead, from a point some miles above the Horseshoe Bend to its confluence with the Yarra River at Footscray. The Yarra River is in a similar condition naturally, up as far as Queen's Bridge, where rocks forming "The Falls" of the early days have been removed by man. This removal has allowed tidal conditions to obtain almost up as far as Johnston-street Bridge, Abbotsford. The lower part of the course of the Moonee Ponds Creek exhibits the same feature. This drowning of the lower parts of these rivers indicates that the latest crustal movement of the country in the vicinity of Melbourne is one of subsidence, which probably is still in progress.

THE OLDER VOLCANIC BASALT.

Although the Quarter Sheet shows an extensive area of Older Volcanic covered by a thin mask of Tertiary deposits, yet good exposures can be seen only where stream or road cuttings have been carried down some distance into this so-called capping. It would be better were the mapping of this area revised, so as to show more truly the actual rocks outcropping at the surface. Along Buckley-street west towards the Horseshoe Bend no Older Basalt is actually met with until almost at the boundary of Essendon city, where a slight exposure of some very much

altered Older Basalt is to be seen in a road cutting near the post marked "E. T. B." Among the alteration products of this basalt may be noted concretions of limonite, hematite, psilomelane, and, most interesting of all, as showing the presence of the element cobalt in our Older Basalts, black concretions of the mineral asbolite, a hydrous oxide of cobalt and manganese. Other exposures of the Older Basalt are to be noticed along the Saltwater River at the Bend, from stream level to varying heights above it. A feature of these exposures is the variable stages of weathering the basalt has undergone in different parts. In some places it has weathered into a red earth like laterite, in others to a soft white wackinite, while in one place a little to the north of the Sand Pits it may be seen on the riverside in as fresh and unweathered a condition as the freshest of the Newer Basalts. Here it is a dense, fine-grained, tough, dark-blue rock, showing rubbly and finely columnar jointing (see Petrographical Note, No. 1). At one point a peculiar egg-shaped structure (about 10 feet in long diameter) of unweathered basalt contains basalt considerably decomposed. The surface of this Older Basalt is everywhere very much eroded. Its probable extent has been discussed by Mr. T. S. Hart (3). The rock on which it rests is not visible anywhere in the vicinity, but it is probable that it is the usual Melbournian (Silurian) shales and sandstones, which constitute so much of the bed-rock of the Melbourne district.

THE NEWER VOLCANIC BASALT.

The Newer Basalt of West Essendon is, for the most part, a mere skin lying on the Tertiary sediments underneath. It is portion of the eastern edge of the vast lava sheets constituting the Keilor Plains, which are continuous with those stretching away into the fertile Western District through the great valley of Victoria. In the aggregate, these Newer Volcanic basalt sheets cover an area estimated at between 9,000 and 10,000 square miles, and are generally accepted as comprising the third largest area of such rocks in the world. The Deccan Plateau, in India, is partly covered with a lava sheet over 200,000 square miles in area, and up to 6,000 feet in thickness (4). In North-Western United States, covering Idaho, Oregon, and Washington, to an extent of over 100,000 square miles, to a depth of several hundred feet (5), and, according to Dr. E. Hull (4), in some places 2,000 to 3,000 feet in thickness, exists another expansive volcanic plain. But there are also extensive volcanic sheets of doubtful age at the top of the Stormberg series (Upper Triassic) in Southern Cape Colony. Of these, Dr. A. H. Green (6) writes:—"Over an area certainly 120,000 square miles in extent, and probably much larger, dykes, sheets, and huge masses of trap meet one at every turn." According to Dr. F. H. Hatch (7),

these basic lavas and ash beds are up to 4,000 feet in thickness. So that, as regards area covered, as well as thickness of flows, our lava plains, it seems, must take at least fourth place.

The points of eruption from which the Newer Basalt of West Essendon proceeded cannot be positively indicated, although it is interesting to note that Mr. R. Brough Smyth (8) has stated that "the basalt through which the Saltwater River has cut a channel has undoubtedly proceeded from Mount Aitkin [? Aitken] and the neighbouring peaks." To the north of the granitic rocks in the Broadmeadows district are several volcanic hills, from one of which, according to Mr. T. S. Hart (3), "the lava streams probably extend round the granitic area to the south-west side of the Moonee Ponds Creek." Portion of this lava stream may have provided the Newer Basalt in the vicinity of the Bend. But on the large geological map (9) of Victoria four cones are marked near Diggers Rest. These cones are all within 12 miles, in a north-westerly direction, of West Essendon, and may quite credibly represent the points of eruption from which the lava flows that provided the Newer Basalt of the locality under discussion originated. Immediately to the south of Diggers Rest the flows have an elevation of about 650 feet. This would give a grade of about 1 in 200 from Diggers Rest to West Essendon, and this slope would be quite sufficient to allow of the flowage of basalts so highly fluid as ours were.

In the vicinity of the Bend the Newer Basalt is a fairly fresh, coarse, vesicular, bluish rock, which in places has undergone partial decomposition, especially along joint planes. On the cliff-face north of the Bend good exposures, showing spheroidal weathering, may be noticed. In places, nodular concretions of hard secondary magnesite are present. In the neighbourhood of the Bend, at least four outliers of Newer Basalt are present. One immediately south of the unsymmetrical terraces previously noticed, and another (Quarry Hill) near the Maribyrnong Bridge, are both marked on the Quarter Sheet; but a small outlier at the Sand Pits, covered with Newer Basalt, and another larger one a short distance east of the Sand Pits, stretching half a mile from north-west to south-east, and a couple of hundred yards wide, are not shown on the Quarter Sheet. It appears, in connection with the latter, that an omission from the Quarter Sheet of the pink colour to represent the Newer Basalt has inadvertently occurred. On Quarry Hill are to be seen some of the best examples of spheroidal weathering of basalt in Victoria, or, in fact, anywhere in the world. The basalt of the two outliers close to the Bend is very coarse and vesicular, approximating to the kind forwarded to Melbourne from Malmsbury for monumental work (see Petrographical Note No. 2). This Newer Basalt is probably of Werrikooian age, resting in this

locality on eroded stratified marine deposits of Kalimnan age.

THE SAND PITS OF THE HORSESHOE BEND.

Resting unconformably on the considerably eroded surface of the Older Basalt occur the grits, sands, and clay beds which are portion of the vast deposits of Tertiary strata of Southern Victoria. An open cut into this material has been made on the eastern outer side of the Bend, and is known locally as the "Sand Pits." These Pits (a picture of portion of which appeared in the *Naturalist* of last July) reveal some interesting features worthy of notice.

Near the lowest parts are beds, a few feet thick, of a coarse, brown, ferruginous grit, bedded very irregularly. This is succeeded by a bed of fine white clay a couple of feet thick, evidently a deep water deposit. Above this is a series of current-bedded sands and grits, consisting mainly of angular particles of quartz. These beds are about 60 or 70 feet thick, are of shallow-water origin, and were probably laid down close to a shore-line where currents were strong. Overlying these is a thickness of from 15 to 20 feet of very fine sand, which is evenly and horizontally bedded, thus showing by these characters a change to quiet water deposition, caused probably by a deepening of the sea on the floor of which the deposits were laid down.

Intercalated amongst the beds of coarser material are thin bands of a black titaniferous iron sand, which Mr. Drew, of the Chemistry School, has determined to be the variety ilmenite. Other black lines occur in the beds. These, on examination, prove to be thin bands of quartz grains coated with a glaze of black lustrous limonite. In still other cases the black colour bands show a highly splendid iridescence, and this was found to be due to a combination of iron and manganese oxides, probably hematite and pyrolusite.

Variations in the amount and character of the iron and other salts present account for the fact that some of the beds are rather firmly cemented, while others crumble away at the slightest touch. On the whole, the beds in the Sand Pits are very loosely consolidated. Along the bedding and incipient joint planes, especially in the evenly-bedded fine sands near the top of the series, thin red and yellow colour bands are arranged fairly regularly, giving a very pleasing optical effect to the beds in which they occur. These colouring materials seem to have been derived from the decomposition of the Older Basalt which occurred both before and after the deposition of the beds. In the grit beds, for many feet over the clay stratum above-mentioned, are clay pebbles scattered in some profusion. Sections of these pebbles, cut and examined microscopically, show no igneous structure, while in one or two cases small quartz

PLATE IX.

FIG. 1.



Ordinary light. X 30 diam.

OLDER BASALT, FROM NEAR SAND PITS.

FIG. 2.



Polarized light. X 25 diam.

NEWER BASALT, FROM OUTLIER EAST OF SAND PITS.

PLATE X.

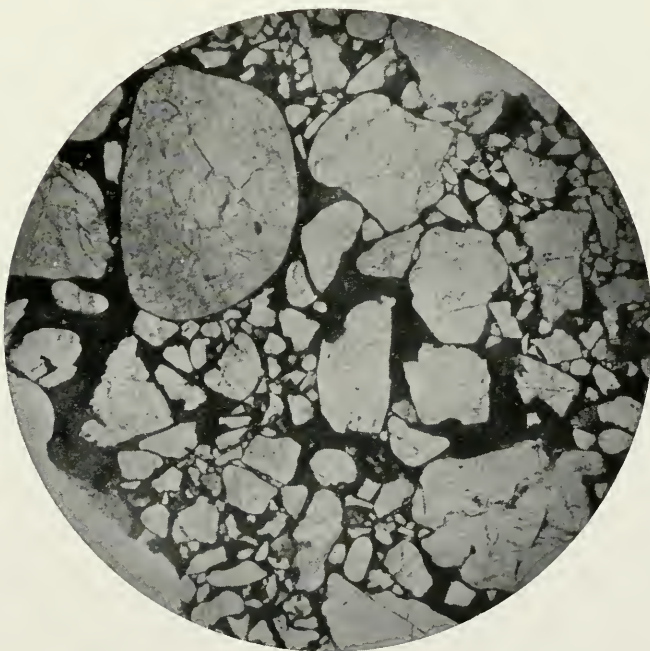
FIG. 1.



Ordinary light. X 35 diam.

GREYWACKE, FROM HORSESHOE BEND.

FIG. 2.



Ordinary light. X 8 diam.

QUARTZITE, FROM SOUTH OF SAND PITS.

grains were present in the substance of the pebble ; so these pebbles were evidently clay before their inclusion in the grit beds. At first sight they might be taken for small water-worn pebbles of Older Basalt included in the grit beds while fresh, and then weathered to wackinite. They remind one of the formation of similar pebbles from clay derived from Older Basalt, which is to be seen proceeding, for example, on the seashore near Anglesea at the present day. The clay bed near the bottom of the Pits was also probably derived from decomposed Older Basalt, although there is a possibility of its origin being decomposed feldspars of a neighbouring granite.

Peculiar pipe-like concretions, in some cases many feet in length, are to be seen in the face of the open cut. These look like branches of trees which have become fossilized ; but careful examination gives no trace of plant structure. In one case, what appeared to be cell structure was, on closer investigation, found to be really a kind of fur of small aggregates of radiating crystallites of iron oxide. Many of the concretions are completely or partially filled with various forms of stalactitic limonite. At present there is no evidence to connect these pipe-like concretions with fossil wood. The weathering-out of these pipes causes hollows to form in the face of the open cut. High up these are utilized by sparrows and starlings, and lower down by rabbits. Mr. D. G. Peele, the manager of the company which works the deposits, who very kindly pointed out many features of interest, and also gave much valuable information, states that originally some of these holes were tenanted by wombats. The sharp, angular, coarse sand of these beds is much sought after for building purposes, the iron present with it, when combined with the builder's lime, causing it to make a very good cement. It is being largely used in the construction of the new bridge over the Saltwater River at Maribyrnong-road. The very fine sand at the top of the beds is, so Mr. Peele states, used not only in Victoria, but is exported to New South Wales and Tasmania. It is eminently suitable, on account of its fineness and evenness, for brass-moulders' work. In fine weather the quantity of building sand taken out from the Pits and screened averages 100 tons a day. As the deposit is not very extensive, it will readily be appreciated that before many years have passed away this interesting geological section will also have disappeared.

With regard to the probable source of the material of the Sand Pits and of the quartzites which will be presently described, and whose original ingredients have been derived from the same source as those of the Pits, Mr. (now Dr.) Hall and Mr. Pritchard (10) write :—"Silurian rocks have probably yielded the greater part of the Tertiary sediments [of the Melbourne district]. In places, however, the sand grains are large and roughened, so

that the presence of granite in the neighbourhood is probable. Such sands occur south-east of Black Rock."

The origin of the clay stratum and pebbles in the Sand Pits has just been discussed. The nature of the sands and grits in the loosely consolidated beds in the Pits, and microscopical examination of the grains in the quartzite, show that they are undoubtedly of granitic origin. The nearest granites to West Essendon now outcropping occur five or six miles to the north, at Mount Gellibrand, Broadmeadows, and at Bulla. These granites, which emerge above the basalts that surround them, show evidences of considerable denudation. From a southern extension of these, now buried under the lavas of the plains, the materials for the major portion of the Tertiary sediments about West Essendon have undoubtedly been derived.

THE TERTIARY QUARTZITE AND GREYWACKE.

At a distance of 100 yards or so to the south of the Sand Pits there is a change from the loosely compacted, friable, ferruginous, quartz sand deposits to intensely indurated quartzite, which rings under the hammer. It palpably contains the same kind of original material as occurs in the Sand Pits, with the addition of a siliceous cement. At a short distance to the north of the Sand Pits, beds somewhat similar to this quartzite, but of very much finer ingredients, are met with. These have been regarded as porcellanite. According to Sir A. Geikie (11), "porcellanite (argillite) is a name applied to the exceedingly indurated, sometimes partially fused condition, which shales are apt to assume in contact with dykes and intrusive sheets or bosses. . . . It is hardly possible to discriminate between such highly baked shales and some of the fine siliceous sediments." The same writer defines greywacke as "a compact aggregate of rounded or subangular quartz, felspar, slate, or other minerals of rock, cemented by a paste which is usually siliceous, but may be argillaceous, felspathic, calcareous, or anthracitic." The lithological character of the so-called "porcellanite" of the Horseshoe Bend does not accord with its being "a highly baked shale." Its composition is such that it agrees closely with Geikie's definition of greywacke (see Petrographical Note No. 3).

In reference to the formation of quartzite, Mr. C. R. Van Hise (12) says:—"One of the most important rocks produced by the cementation process is quartzite. The term 'quartzite' is restricted to quartzose sand rocks which have been so firmly indurated by the cementing processes that when broken the fractures pass through the original grains and not around them." With regard to the question as to whether quartzites are formed below or above the sea, he writes:—"The cementation of sands must take place after they have been raised above the sea, and

an underground circulation has been established. Even after these conditions exist, and the conditions are favourable to a vigorous underground circulation . . . cementation is still very slow." He further states that the time necessary to form quartzite from sands is enormous, and that, on the average, it is necessary that 260,000 parts of water should pass through a sandstone formation to deposit one part of quartz. Therefore, quartzites formed by ordinary underground circulation of waters are of very slow formation. As a corollary to this it follows that the most extensive quartzite formations are found in Palæozoic and Mesozoic strata, where there are beds of such material of enormous extent. No extent of Tertiary quartzites comparable with the more ancient formations seems to exist.

In Egypt, near Cairo, are found Tertiary quartzites, the method of formation of which has led to a great amount of discussion. Professor Dawson (13) thought that siliceous springs were responsible for the cementation of the sands; but Professor Zittel (14) says (trans.) :—" Hot springs are not necessary to account for the silicification of the fossil trees [and the sandstones]. . . . One seeks in vain for siliceous sinter, and of this product of geysers no one has yet seen anything." Others have endeavoured to account for the quartzite of the area on the assumption that volcanic activity was the agent that formed it; but Captain Lyons connects the presence of vast numbers of silicified trees with its formation. He writes (15) :—" There is no doubt that the siliceous cementation of the sandstones, and the molecular replacement of the woody structure of the fossil trees by silica, are results of one and the same action. . . . Over the whole of this area, at three points only . . . have eruptive rocks been recorded. . . . Considering the large amount of decaying vegetable matter there must have been in the sands of an estuary into which such numbers of trees were drifted, I would suggest the action of water holding natron (sodium carbonate) in solution as a possible explanation." He then details the process whereby the vegetable matter would cause the silicification of the sandstone. Sir A. Geikie (16) mentions Eocene quartzites, known as grey wethers, in Wiltshire, which occur also over the north of France towards the Ardennes :—" They have been used for the huge blocks of which Stonehenge and others of the so-called Druidical circles have been constructed; hence they have been termed Druid-stones. Other names are Sarsen stones (supposed to indicate that their accumulation has been popularly ascribed to the Saracens), and Grey Wethers, from their resemblance in the distance to flocks of (wether) sheep." In the south of Cape Colony, at a few places, probably Lower Tertiary in age, quartzites and siliceous conglomerates occur, forming cappings

to the hills and lying on formations up to Cretaceous in age (17).

The only Tertiary quartzites referred to by Mr. R. A. F. Murray (18) as being found in Victoria are those which "have been found to be clearly antecedent to the Older Volcanic rocks." He makes no mention of any quartzite found above the Older Volcanic. Messrs. Hall and Pritchard (19) discuss a mass of 90 feet of quartzites near Maude, which occur beneath the Older Volcanic, and mention younger beds at Keilor, beneath the Newer Volcanic basalts. Quartzite and greywacke in beds of pre-Newer Volcanic age occur not only at West Essendon, but at many other localities in the vicinity of Melbourne. In all cases they occur as patches of variable area, and often quite close to sediments which show, as a rule, very little cementation. To account for this erratic manner of occurrence, it has been suggested that alkaline waters draining along and through portions of the Newer Basalt have caused the solution of silica, which has become re-deposited as a siliceous cement amongst the quartz grains of the beds, firmly binding them together. But in many localities where water is seen freely to pass into the underlying sands after percolation down through the overlying basalt, such sands are found to be almost as little bound together as the sands of the seashore. This may be noticed, for example, in the ancient river sands under the basalt of both the Clifton Hill and Burnley quarries, as well as in the sands under the basalt at North Coburg. Such an explanation for the silicification does not seem to be satisfactory.

Messrs. Irving and Van Hise refer to this idea in connection with the formation of silicified sediments in Wisconsin, of which they write (20):—"These greywackes occur interstratified in a great thickness of unaltered sandstones. Moreover, they lie many hundred feet above the latest of the great flows of eruptive material, so that the alteration can in no way be attributed to igneous action." While, as far as is known, our pre-Newer Basaltic quartzites are closely associated with the presence of overlying basalt, their cementation need not necessarily be due to that fact. It is well known that the last stages of vulcanicity are characterized by the welling-up of hot springs of mineral water, as well as by emanations of gases from below. In parts of Victoria mineral springs still exist, many of which may be regarded as representing the very latest dying stages in the volcanic activity of the districts where they are found. The Hepburn Springs, near Daylesford, and the Drysdale Springs may be cited as examples, the water in the former being highly carbonated as well as bearing other ingredients, while that of the latter is charged with sulphuretted hydrogen. It may be mentioned that a spring exists in the cliff-

face to the north of the Bend. It seems quite feasible to associate the cementation of the quartzites with the saturation of localized masses of the beds with thermal waters rising from below bearing silica in solution, which would be deposited amongst the grains of quartz. This cementation appears to have proceeded comparatively rapidly (see Petrographical Note No. 4). Except occasionally as road metal, our quartzites are not utilized in any way. Of the Egyptian quartzites, Lieut. Newbold (21) states that the more compact varieties of the rock in the vicinity of Cairo have been lately [1848] employed by the Pacha for macadamizing the open squares of his palaces. Professor J. W. Dawson (13) says of the same material:—"It may be worthy of remark that while this hard sandstone is now used only for millstones and for macadamizing the roads, it furnished to the ancient Egyptians the material of some of their most enduring sculptures." "The blocks of grey wether sandstones," writes Mr. W. Whitaker (22), "form an admirable building stone being almost indestructible by the weather. . . . Examples may be seen at Windsor Castle, great part of which is built of this stone. Small cuboidal dressed blocks of grey wether sandstone are also used for paving." These extracts may suggest possible uses for our local quartzites.

THE AGE OF THE BEDS.

In a paper by Mr. G. B. Pritchard (23), the latest addition to the localities where Tertiary fossils have been procured in the neighbourhood of Melbourne was made. Since then Mr. Pritchard has discovered Tertiary fossils in at least three new localities in the Essendon district, and he has very kindly offered to allow the records to be incorporated in this paper. One locality is at the corner of Mount Alexander and Pascoe Vale roads, from which the fossils procured were not well preserved, but still were highly suggestive of the lower beds at Royal Park. The next locality is where Ardmillan-road joins Taylor-street. Amongst the identifiable fossils obtained here were *Cerithium flemingtonensis*, McCoy, and *Acmæa*, sp. Mr. R. C. Wilson, of the Geology School, has also obtained *Haliotis navosoides*, McCoy, from this locality. The third locality is at West Essendon, on the boundary of the city of Essendon, in Buckley-street west. On the south side of the street, immediately opposite the post marked "E. T. B.," Mr. Pritchard discovered ironstone of a similar lithological character to the Barwonian beds at Royal Park, and this contained *Cerithium flemingtonensis*, McCoy. Mr. C. Waters and the writer subsequently visited the locality, and, about 30 yards to the east of the spot where Mr. Pritchard made his discovery, succeeded in finding several specimens of *Cerithium flemingtonensis*, McCoy, as well as *Conus ligatus*,

Tate, *Cypræa subsidua* (?), Tate, and a Cidaroid spine. These specimens are quite typical enough to fix the age of these beds, which here lie close above the eroded Older Basalt, as being Barwonian (Eocene). These beds in this district occupy small pockets in the eroded Older Volcanic, and are overlain unconformably by extensive deposits of Kalimnan age. It is quite safe to assert that the grits and sands of the Sand Pits, as well as the quartzite and greywacke, are of Kalimnan (Miocene) age. The Older Volcanic is Barwonian (Eocene), and the Newer Volcanic probably Werrikooian (Pliocene) in age. The above new records, and those previously established (10 and 23), together with the absence of records of the presence of Barwonian fossils further inland, tend to indicate that, in the area north-west of Melbourne, the shore-line of the Barwonian sea extended through Royal Park, Moonee Ponds, West Essendon, and Keilor.

SUMMARY OF THE GEOLOGICAL HISTORY OF THE LOCALITY.

Through the Upper Palæozoic and Mesozoic periods erosion of the Melbournian (Silurian) sandstones and shales proceeded, laying bare the plutonic igneous rocks which had consolidated beneath. The drainage system developed was obliterated by an outpouring of lavas—the Older Volcanic basalts—of early Tertiary (Barwonian) times. These basalts were deeply eroded, and then the area was sunk beneath a shallow sea, in the proximity of a shore-line. Barwonian sediments of a highly fossiliferous character were laid down. Uplift occurred with subsequent denudation of the land. This was followed again by a subsidence, which resulted, in the main, in shallow marine conditions. Oscillatory movements of the area took place on a minor scale while the Kalimnan sediments, which were derived from an area mainly of granitic rocks, were being deposited. The land was re-elevated and dissected, with the development of a new river system, which was soon followed by the extrusion of the Newer Volcanic basalts of the Keilor Plains. The latest stages of vulcanicity in the locality were marked by sporadic springs, which silicified patches of the Tertiary sediments. The lava floods smothered out of existence the last-developed river system, and on them was superimposed a new set of drainage channels, one of which developed into the present Saltwater River. Small oscillations of level of the land with relation to sea level continued. These probably resulted in the formation of river terraces. The latest movement has been one of subsidence, causing a cessation in the active work of vertical corrasion being carried on by the Saltwater River, and drowning the stream for some miles up from its mouth, so that sea water is found above the Horseshoe Bend. The valley of the river is at present undergoing the process of being slowly widened out

by the removal of material from its sides. This will continue until the whole valley has become many miles wide, with almost a flat floor.

In concluding, I should like to thank Professor Skeats for facilities afforded me in the geological laboratory; Mr. Pritchard, for his help with the palæontology; and Mr. Grayson, for preparing the photo-micrographs.

PETROGRAPHICAL NOTES.

No. 1.—*Older Basalt*, from river level, immediately north of the Sand Pits.

Macroscopically, this is a very tough, dense, close-grained basalt of a dark colour. With the unaided eye no crystals can be distinguished. Spots of a green amorphous mineral appear on freshly fractured surfaces. These spots become black after a short exposure to the atmosphere, and evidently consist of hallosite.

Microscopically, the rock consists of small, perfectly unaltered phenocrysts of olivine, some of which have been slightly corroded by the magma. Many show interpenetrative twinning. Plagioclase laths and microlites are scattered promiscuously, with no attempt at fluidal arrangement. Brown augite has begun to crystallize out in small grains from a ground mass of abundant brown glass. Numerous minute octahedra and specks of magnetite are present. No vesicles are present in the rock.

No. 2.—*Newer Basalt*, from surface of outlier east of the Sand Pits.

Macroscopically, this is a tough rock of bluish colour, which under the hammer sounds dully, and does not easily break, but tends rather to pound up, when struck, into a grey powder. It is vesicular, some of the vesicles containing minute stalactites of calcite depending from the upper portions into the vesicles. Its texture is very coarse, the crystals being quite easily distinguishable by the unaided eye.

Microscopically, it shows original phenocrysts of olivine very much altered, sometimes on the outside and sometimes wholly, to a secondary reddish-brown, non-pleochroic mineral, which extinguishes simultaneously with the olivine it surrounds or replaces. This agrees with the mineral iddingsite, which often develops from olivine in basalts on the top of flows. In some cases the alteration of the olivine to iddingsite has been accompanied by the formation of small spherulites of chalcedony. Long lath-shaped feldspars, showing twin lamellæ, are present in abundance. These feldspars, by measurement of their extinction angles, are seen to come well up to the soda end of the soda-lime series of plagioclase feldspars, and should be classed as oligoclase. Broad tabulate feldspars, well developed on the face 010, are

sparingly present, and seem to have been the last original mineral to crystallize out. These are seen to extinguish from the centre outwards in such a way as to show a composition ranging from oligoclase through albite apparently to orthoclase, the edges consisting probably of orthoclase. There is also an indication in parts of extremely minute cross-hatching or microcline twinning. These broad crystals are most probably anorthoclase. The other minerals present are pale violet-brown interstitial grains of titaniferous augite and irregular coarse needles and small patches of magnetite. Needle-shaped microlites of feldspar are also abundantly present. Apatite appears to be quite absent.

No. 3.—*Greywacke*, from north cliff face, Horseshoe Bend.

Macroscopically, this is an exceedingly indurated, firmly-compacted rock of various light colours, as white, creamy-coloured, and grey, in many cases banded with fine lines of a darker colour. Its texture is exceedingly fine, no structure being visible even with a lens. It rings under the hammer, and breaks with a conchoidal fracture, giving sharp cutting edges. For this reason it was, in the past, freely used by the aborigines, who made flakes, chips, and skinning knives from it.

Microscopically, it is seen to consist essentially of very minute granules of quartz and a fine dust of decomposed turbid feldspar. Tiny flakes of brown mica and of white mica are present, and a black dust, which may be ilmenite or magnetite, is disseminated amongst the other granules. Numerous small particles of an iron oxide are arranged so as to present a banded appearance. Tiny crystals of zircon and tourmaline also occur. The whole of the above are firmly cemented together by interstitial chalcedonic and amorphous silica.

No. 4.—*Quartzite*, from spur south of the Sand Pits.

Macroscopically, this is an extremely hard, ringing, ferriferous rock, ranging in texture from very fine to conglomeratic, and in colour from white, through greys and yellows, to dark red. It breaks with a fracture varying from conchoidal to flat.

Microscopically, thin slices show the rock to be mainly composed of large rounded water-worn, and smaller angular grains of quartz. Feldspar grains are very sparsely present. In one case a feldspar grain is saturated with silica. Most of the quartz grains are fragments of single quartz individuals, but in some cases the grains consist of many differently orientated, interlocking areas, such as can be seen, for example, in a thin section of a granodiorite. Several grains of the sand show a micrographic intergrowth of quartz and feldspar. In the quartz fragments are inclusions of zircons, brilliantly polarizing and showing high relief, numerous small crystals of apatite showing low polarization colours, brown mica, small crystals of turbid

felspar, and tiny portions of glass. The cementing material was originally oxides of iron, but this has been invaded and reinforced by a siliceous infiltration which borders many of the quartz grains to a slight extent with quartz in optical continuity, and from the borders fades away gradually into a fine, independent, interstitial, chalcedonic silica, which is mixed with the iron oxide. The character of the sand grains in the quartzite indicates that they are undoubtedly derived from some such rock as a granodiorite or a granite. The character of the siliceous cement, and the fact that many of the sand grains are quite angular, point to the conclusion that the deposition of the silica was rapidly effected.

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23. PRITCHARD, G. B.—Eocene Deposits of Moonee Ponds. *Vict. Nat.*, vol. xviii., No. 4 (August, 1901), p. 61.

EXPLANATION OF PLATES.

Plate ix.—Fig. 1.—Photo-micrograph of thin slice of Older Basalt, from near river-level, just north of the Sand Pits. Ordinary light. $\times 30$ diameters. See Petrographical Note No. 1.

Plate ix.—Fig. 2.—Photo-micrograph of thin slice of Newer Basalt, from surface of outlier east of the Sand Pits. Two of the broad tabulate felspar crystals are shown. The large dark patches are steam vesicles. Polarized light. $\times 25$ diameters. See Petrographical Note No. 2.

Plate x.—Fig. 1.—Photo-micrograph of thin slice of Greywacke, from cliff-face north of Horseshoe Bend. The extremely fine character of the ingredients of the rock is shown. Ordinary light. $\times 35$ diameters. See Petrographical Note No. 3.

Plate x.—Fig. 2.—Photo-micrograph of thin slice of Quartzite, from spur south of the Sand Pits. The mesh of dark-coloured cementing material is shown. Ordinary light. $\times 8$ diameters. See Petrographical Note No. 4.

BIRD DAY.—This movement, which was taken up with great enthusiasm last year, will, it is expected, be carried out with even better results this year. The day selected is Friday, 28th October, and Mr. J. A. Leach, M.Sc., Inspector of Schools, Education Department, will be pleased to have the names of those who are willing to assist by giving brief addresses or demonstrations at the schools as early as possible, so that the details of the arrangements can be completed.

THE NALLODEE.—A new animal belonging to the native cat tribe was lately discovered in a spinifex desert out east of the Pilbarra district, Western Australia, by an exploring party. It lives in burrows, which have several entrances and contain a

series of passages ; the latter are excavated at different levels, so that the occupants may not be flooded out during the tropical rains. The fur of the Nallodee is of a sandy colour, speckled minutely with brown, and the nose has a pale yellow tip. The animal is nocturnal, and lives chiefly on lizards, insects, frogs, and bush mice. Its common name is of native origin, the animal being known to scientists as Bligh's Phascologale, in honour of the leaders of the party which discovered it—viz., Messrs. W. and A. C. Bligh, lately pearlers of Broome, W.A. Specimens of the animal have been sent to the Western Australian Museum, Perth.

“JOURNAL OF AGRICULTURE,” VICTORIA.—The July number of this publication is more than usually interesting to the non-farmer by the variety of its contents. “Tree Planting for the Beautifying of Cities and Towns” is dealt with by Messrs. A. W. Crooke, late Acting-Conservator of Forests, and J. Blackburne, Inspector of Forests, who point out methods for obtaining the best results, illustrating their remarks with pictures of the street trees in Castlemaine, Bendigo, Camperdown, &c. Mr. D. McAlpine deals with the genuine locust fungus, showing that hitherto the wrong production has been circulated as the locust fungus. An interesting article on the purification of muddy waters, by Mr. A. C. H. Rothera, M.A., shows that one of the best agents for the purpose is iron chloride, and if used at the rate of 1 lb. to 1,000 gallons the chemical is thrown out with the mud, taking the bacterial organisms with it, reducing them from 22,000 to 240 per cubic centimetre. Mr. C. French, jun., Assistant Government Entomologist, deals with household pests, such as house-flies, mosquitoes, and clothes-moths, and points out methods by which their presence may be greatly lessened in our homes.

“THE COUNTRYSIDE MONTHLY.”—We have received from the editor, Mr. E. Kay Robinson, 210 Strand, London, W.C., England, the first number of this new publication, which is the official organ of the British Empire Naturalists' Association, the Schools' Mutual Aid and Flower Fund Society, and the New Collectors' Club. The part, consisting of 42 pages medium octavo, is well illustrated, and contains a coloured plate of a young male Great Spotted Woodpecker. The articles are well written, and the journal should be popular among English nature-lovers. The published price is 4d. monthly.

SCENERY PRESERVATION.—The annual report of the New Zealand Board for Scenery Preservation has recently been issued, and contains an interesting record of progress. During the year, 3,470 acres were added to the reserves, and, making

allowance for certain revocations, no less than 40,546 acres are now reserved for this purpose. Some extracts from the report of Mr. E. Phillips Turner, Inspector of Scenic Reserves, may be of interest, many of them being applicable in our own State :—

“Noxious Weeds.—These get into the reserves through stock being allowed access. In pure virgin bush probably none of these pests could stand the altered environment, absence of sunlight and dampness in particular; but when the stock have eaten and broken down the native undergrowth, the seeds of noxious weeds that they carry on their hoofs and drop in their dung find a situation where they can germinate and thrive.

Fires.—The greatest danger threatening our reserves is from fire, and on this account no adjoining settler should be allowed to cut down and burn off the usual one chain within the reserve boundary. It is quite sufficient for fencing if four feet within the boundary is cleared. When the usual chain is cleared it has to be grassed, and afterwards stock have to be put on to keep down the grass, with the certain result that (except an inner fence be erected) they wander into and damage the bush by eating out the undergrowth, and assist in the establishment of noxious weeds. In Europe and America the preservation of the forest on steep hills is not a mere ephemeral fad, but scientific, and lay papers continue to show the really lively interest that is taken in the subject. In this Dominion the country dwellers are generally indifferent to or hostile to forest preservation. If one points out to them what has been the result of deforestation in other countries, one is considered a faddist. The evil effects of deforestation in the back districts have not yet been sufficiently serious to impress them.” He concludes by saying that the present *Land Act* encourages a settler to clear all his holding. It would be well if it were amended so that every future selector of second and third class rural lands be compelled to leave in forest 10 per cent. of his holding. He should not be charged any rental for the percentage left, but should be called upon to fence it with a cattle-proof fence. He could get his firewood and fencing material from the preserved part. The best channel for disseminating a knowledge and appreciation of the value of the preservation of forests is the public school. The children are already given nature lessons, and are encouraged to interest themselves in gardening, and I think there might also be added a few simple lessons explaining the value of the bush as a reservoir for the supply of water for streams, its action in preventing or lessening floods, its climatic influence, &c.—all most important questions, but not beyond the mental capacity of a child of twelve.”

Field Naturalists' Club of Victoria.

EXHIBITION OF WILD FLOWERS,

MONDAY and TUESDAY, 10th and 11th OCTOBER.

THE COLLECTION OF WILD FLOWERS.

FRIENDS desirous of assisting in making the Exhibition of Wild Flowers a success, are requested to bear in mind the following suggestions.

If possible, visit the place where you propose to collect, a few days previously, and see what flowers are available.

Much time will be saved in Melbourne, and a better display of the flowers made, if collectors will proceed as follows:—

Advise the Secretary not later than 7th October, of intention to exhibit.

Take a large tea tin or covered box to the locality, and as the flowers are picked, make up each species into separate small bunches with stem diameters of about half-an-inch, so that they may easily fit the Exhibition tubes used for the display, but not so tightly as to bruise tender stalks.

Wrap the stems of each bunch in some damp rag or newspaper, pack fairly tight in the box, when filled cover the whole with some damp newspaper and close up, air-tight.

Unless sending fairly large pieces of flowering shrubs, do not send any flowers loose. A few flowers well packed are of more service than a larger quantity sent anyhow.

Forward packages to Melbourne, directed—"Secretary, Field Naturalists' Club, Spencer Street," or "Prince's Bridge Station" (as most convenient), **"To be called for."** In every case mark package—"Wild Flowers With Care," with name and address of sender, and despatch so as to arrive in Melbourne not later than **2.30 p.m. on 10th**, advising Hon. Sec., MR. A. D. HARDY, Forest Department, Melbourne, **by previous post**, of intended despatch.

The Committee will be pleased to pay cost of carriage of packages at Melbourne.

As the flowers are very perishable, if any friend will send a second supply on Tuesday, 11th, under above conditions, the Committee will be very thankful.

The Victorian Naturalist.

VOL. XXVII.—No. 6.

OCTOBER 3, 1910.

No. 322.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 12th September, 1910.

The president, Mr. F. Wisewould, occupied the chair, and about 70 members and friends were present.

The president, in a few words, feelingly referred to the death of Mr. F. R. Godfrey—who had been a member of the Club almost from its inception, though not a very frequent attendant at its meetings—and to the great loss sustained by the community, but more particularly by the ornithological sections of the various natural history societies.

CORRESPONDENCE.

From Mr. A. J. Wells, Smith's Gully-road, near Queenstown, communicated by Mr. J. A. Leach, M.Sc. The writer drew attention to the wanton destruction of small birds by school children, who in that district were to be seen on their way home from school competing for the highest record of birds killed; and also to the practice of using small birds for cod-fishing bait along such rivers as the Murray, Goulburn, and Yarra Yarra—a practice by which thousands of small birds were destroyed. The letter was referred to the committee for consideration.

REPORTS.

A report of the excursion to Eltham on Saturday, 13th August, was furnished by the leader, Mr. C. French, jun., who stated that, favoured by a beautiful afternoon, a party of about 30 members and friends had attended. The object of the excursion was to see the Silver Wattles, *Acacia dealbata*, in bloom, and the party was fortunate in seeing many trees at their best. A very fine specimen of one of the shrubby acacias, *A. diffusa*, was noticed in bloom, also a few of the early spring flowers. Some attention was paid to scale-insects and galls, and several larvæ of the longicorn beetle, *Uracanthus simulans*, were collected. Before leaving for town the members accepted the invitation of the president to late afternoon tea.

A report of the excursion to Black Rock on Saturday, 27th August, was given by the botanical leader, Mr. J. P. M'Lennan, who reported an attendance of sixteen members, including several ladies. Attention was directed to the typical coast plants of the locality, among which *Acacia longifolia*, var.

sophora, in full bloom, was the most conspicuous. The reasons were pointed out as to why the *Mesembryanthemum* had developed a thick skin containing few stomata. Nearly forty species of plants were noted in bloom, among which may be mentioned the orchids *Pterostylis cucullata* and *P. pedunculata*. Interesting features connected with the mistletoes and sundews were commented on, and several fine specimens of the Climbing Sundew, *Drosera Menziesii*, were examined, and found to have many minute insects imprisoned by their leaves. A brief inspection was made of the old historic "Black Rock House," built by the Hon. Chas. Ebdon between sixty and seventy years ago of stone quarried from the sea-cliff close by. In the grounds were noticed two magnificent Moreton Bay Fig-trees, probably the largest in the State, and general regret was expressed that this fine sanctuary for birds and plants would soon pass into the hands of the builders. The ornithological leader, Mr. E. B. Nicholls, forwarded a few notes, in which he stated that the destruction of the shelter at Black Rock would render at least a thousand birds homeless. Some might find other homes in the district, but the majority would disappear entirely, among them fifteen to twenty pairs of the Ground-Thrush, *Geocichla lunulata*, which for many years had frequented the spot. During the afternoon a flock of some two hundred Cormorants had been noticed chasing the pilchards in the Bay. They kept just above the water, in a straight line, at right angles to the shore, and extending for fully three hundred yards, the birds being about a yard apart.

The hon. secretary reported that, owing to the stipulated number of names not having been handed in, the excursion set down for Whittlesea for Thursday, 1st September (Show Day) had lapsed: and that, owing to very inclement weather, the excursion to Croydon for Saturday, 10th September, had been abandoned.

ELECTION OF MEMBERS.

On a ballot being taken, Miss Thelma Hill, Beaconsfield-parade, Middle Park, was duly elected as an ordinary member; Mr. Daniel Ingle, Healesville, and Dr. Alfred E. Shaw, M.R.C.S., F.E.S., of Healesville, as country members; and Miss Edith Twyford, "Kardella," Elsternwick, as a junior member.

LECTURE.

An interesting and instructive lecture, entitled "The Birds of Victoria," was then given by Mr. J. A. Leach, M.Sc. The lecture had been announced to be illustrated with lantern slides, but, owing to a misunderstanding on the part of the emergency lanternist, who did not attend, these were unable to be shown. The lecturer, however, was not dismayed by the inconvenience,

and dealt with the classification of Victorian birds so readily and thoroughly as to gain him a hearty round of applause at the conclusion of the lecture. Attention was also called to the many unique features of the ornithological fauna of the State, and comparison made with that of other portions of the world.

The chairman, Messrs. Barnard, Keartland, Pitcher, St. John, Hardy, Armitage, and M'Caw took part in the discussion which followed, their remarks ranging over considerable ground, and showing that the lecture had secured the interest and sympathy of other members of the Club than those especially devoted to ornithology. Mr. A. W. Milligan, a well-known ornithologist, and a former member of the Club, was present as a visitor, and also spoke.

EXHIBITS.

By Mr. F. G. A. Barnard. — Growing fern, *Botrychium ternatum*, collected by the exhibitor over twenty years ago at Oakleigh.

By Mr. C. French, jun.—Abnormal growths of "Arum Lily," *Richardia africana*, and of Snapdragon, *Antirrhinum*.

By Mr. C. J. Gabriel.—Marine shell, *Birostra valva*, Linn., from Hong Kong.

By Mr. H. E. Horner.—Quartz crystal from Beenak; fossil shark's tooth from limestone quarry, Waurn Ponds, near Geelong, with photograph of the locality.

By Mr. P. R. H. St. John.—Twig of *Eucalyptus vitrea*, R. T. Baker (*E. vitellina*, Naudin), a natural hybrid of *E. coriacea* x *E. amygdalina*, collected at Eltham during excursion of 13th August, 1910.

After the usual conversazione the meeting terminated.

DOVES IN THE CITY.—A pair of Doves, with more than ordinary courage, have thrown all their traditions to the winds, and have taken up their home in an elm tree at the corner of Swanston and Collins streets, immediately in front of the Town Hall, where they have been busy all last week building a nest. The birds have been intensely and entirely absorbed in their work of nest-making, and it was completed on Sunday, since which time the hen bird has laid and is now sitting upon the eggs, regardless of the heavy rain and the noisy clangour of the trams that cross this busiest intersection in the city. The male bird is constant in his attendance and attentions upon his mate, and they are both so preoccupied with their home duties that they appear to be entirely oblivious of the interminable noises that are created by the busy traffic in the streets around them."—*Age*, 29th September, 1910.

THE FLORA OF THE VICTORIAN ALPS.

BY ALFRED J. EWART, D.Sc., Ph.D., F.L.S., Government Botanist
and Professor of Botany in the Melbourne University.

With a Botanical Report by J. W. AUDAS, Herbarium Assistant.
(With Map.)

(*Read before the Field Naturalists' Club of Victoria, 8th August, 1910.*)

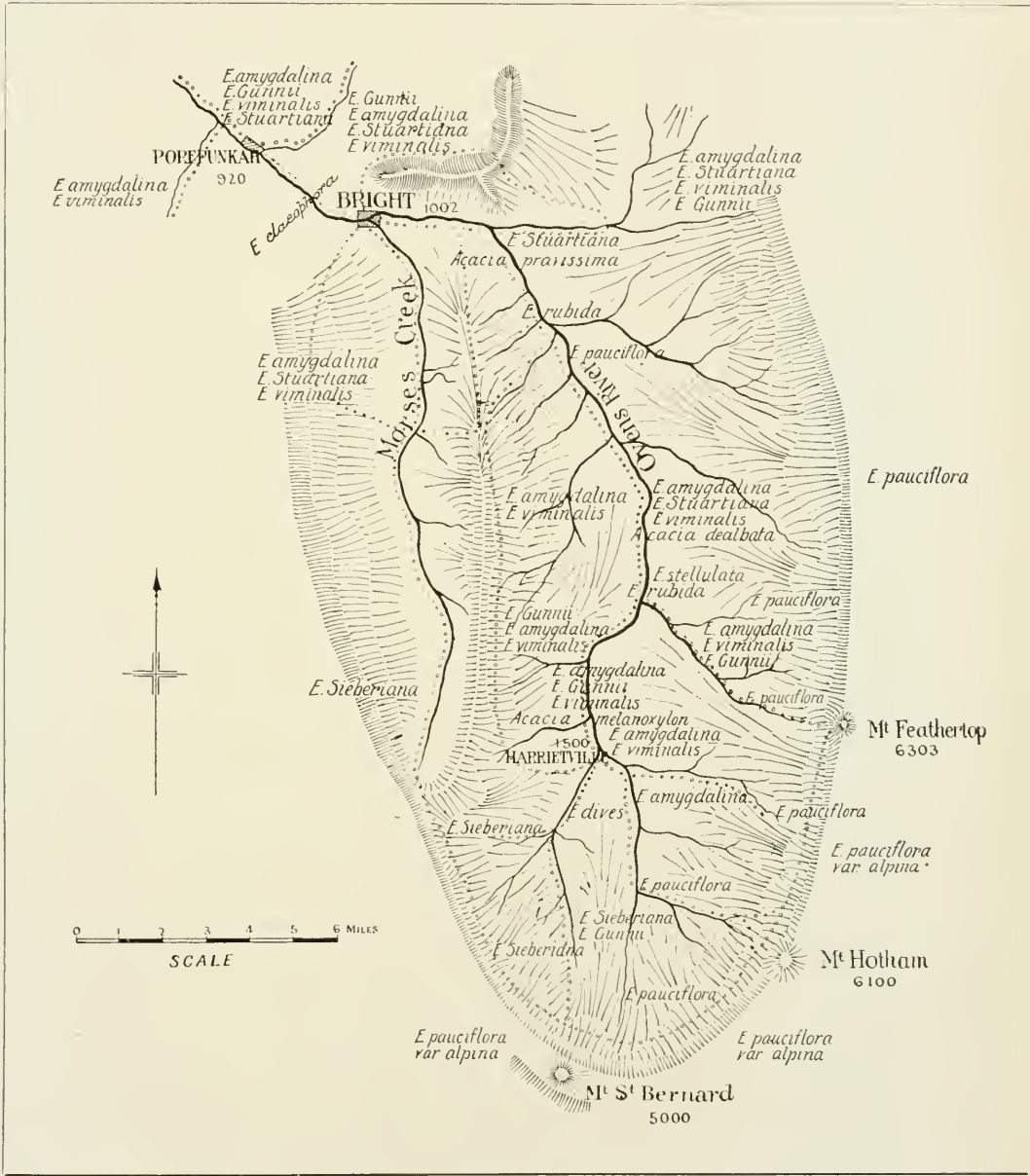
DURING a week's visit (30th May to 4th June last) to the valley of the Ovens River by Mr. Audas and myself, to investigate the forest resources of the district, the spread of the introduced weed St. John's Wort, and the effects of gold-dredging on agricultural land, opportunity was taken to make as complete a collection as possible of the plants of the district, which was traversed in various directions, as indicated on the appended plan. The plan also shows the approximate habitats of various eucalypts and acacias growing in the Ovens valley. In spite of the unfavourable time of the year, a fair number of plants were found in flower and fruit, as is shown in the following list. Mr. Audas, in particular, with the aid of a bicycle, covered a very large amount of ground. Over 200 species of plants were collected or noted during the present trip, but the chief interest of the list lies in the alpine plants of restricted range, and also in the fact that many plants of the plain were found at considerable elevations.

Nine naturalized alien weeds have crept into the local flora, and one in particular much more than holds its own. Immediately around Bright, and for a few miles along the valley, the flora, apart from trees, consists mainly of St. John's Wort. The shire has no thistle inspector, and no attempts appear to have been made to prevent its spread of late years. On cultivated land the weed is easily suppressed, and wherever dense timber is present it grows little or not at all. Its presence does not appear to injuriously affect the development of forest trees, so that on well-afforested land the weed is harmless. A number of other alien weeds grow in the district, particularly near or on cultivated ground; but on the mountain-sides the native flora, for the most part, holds its own.

The alpine portions of Victoria have on several occasions been visited by botanical collectors, who have recorded their observations in the pages of the *Victorian Naturalist*: and though the Buffalo Mountains and Mount Bogong are not usually regarded as belonging to the Victorian Alps proper, for the sake of facility of reference I have included the records of those parts in the list of plants given herewith.

The Victorian Alps form portion of the Great Dividing Range of the State, and have their culminating point in Mount Hotham, 6,100 feet above sea level. Mount Feathertop, 6,303 feet, is on

PLATE XI.



MAP OF OVENS VALLEY
(Showing routes taken).

a spur about eight miles north of Hotham, while the Buffalo Mountains, which range from 4,500 to 5,600 feet, are about twenty-five miles north-west of St. Bernard, and due west of Bright. The Bogong Ranges, of which Mount Bogong (6,508 feet) is the highest peak and Victoria's highest mountain, lie about twenty-five miles north-east of St. Bernard and sixteen miles east of Bright.

The articles to which I refer are:—(1) Mr. James Stirling, "Notes on the Flora of Mount Hotham" (*Vict. Nat.*, iv., 72, Sept., 1887); (2) Mr. Chas. Walter, "A Trip to the Victorian Alps" (*Vict. Nat.*, xvi., p. 81, Sept., 1899); (3) Mr. J. H. Maiden, F.L.S., "Some Notes of a Trip to the Victorian Alps" (*Vict. Nat.*, xvii., p. 43, July, 1900); (4) Mr. F. G. A. Barnard and Dr. C. S. Sutton, "Among the Alpine Flowers" (*Vict. Nat.*, xx., 4, May, 1903); (5) Report of Field Naturalists' Club Camp-out at Buffalo Mountains—"Botany," by Mr. G. Weindorfer, to which is appended "A Visit to Mount Bogong," by the same author (*Vict. Nat.*, xx., 152 and 156, March, 1904). In addition to the foregoing, Mr. Weindorfer contributed a paper entitled, "Some Considerations of the Origin of the Alpine Flora" (*Vict. Nat.*, xxi., p. 6, May, 1904), and Mr. F. G. A. Barnard one entitled "Some Early Botanical Explorations in Victoria" (*Vict. Nat.*, xxi., 17, June, 1904), both of which contain references to the alpine flora.

To the records of the above writers I have added the records by Baron von Mueller in Bentham's "Flora Australiensis," vols. i.-vii., and the results of the recent Herbarium trip, which together should make a fairly complete census of at any rate the more conspicuous species of our alpine plants.

Those members who are interested in the flora of the more elevated portions of Victoria will find further references in the following papers published in the Club's journal:—Mr. E. O. Thiele, "A Trip to Mount Wellington, Gippsland" (*Vict. Nat.*, xxii., p. 30, June, 1905); Mr. G. Weindorfer, "A Trip to the Grampians" (*Vict. Nat.*, xxii., 45, July, 1905); Dr. C. S. Sutton, "A Trip to Mount Baw-Baw" (*Vict. Nat.*, xxii., 58, August, 1905); and the same author, "A Botanist at Mount Buller" (*Vict. Nat.*, xxiii., 175, February, 1907).

The detailed study of the alpine floras of Victoria is a subject of considerable interest, and in this connection mention may be made of certain records of distribution made by Mr. A. G. Campbell in his paper, "Rambles in the Grampians," recently published in the *Victorian Naturalist*, vol. xxvii., June, 1910. On p. 33,* *Banksia integrifolia*, L., is quoted as occurring at

* *Eucalyptus capitella*, Smith, should, of course, be *E. capitellata*, Sm., and *Dicksonia Billardiera*, F. v. M., should be *D. Billardieri*, F. v. M. (*D. antarctica*).

high alpine elevations. Mr. Campbell informs me that he based his statement on the name given in the list by Weindorfer. Neither Mr. Weindorfer nor Dr. Sutton retained specimens of the plant either from the Grampians or from the Victorian Alps, and Dr. Sutton naturally hesitates from memory to affirm to which species the specimen actually found belonged. *B. integrifolia*, L., is, however, a coastal species, and the record probably refers to *Banksia marginata*, Cav., which does ascend to alpine elevations. No specimens were seen growing in the Victorian Alps during the present trip, so that the species, whichever it may be, cannot be very abundant. On p. 35, *Thelymitra fuscolutea*, R. Br., is quoted as a South Australian species found growing in the Grampians. The plant has long been known as a native of Victoria, South Australia, and Western Australia. On the same page, *Caladenia filamentosa*, R. Br., is given as a South Australian species occurring in the Grampians. It is difficult to trace this species geographically, since Mueller included it under *C. Patersoni*; but Bentham gives it from all the southern states excepting Victoria, though apparently only in low-lying districts. Again, three ferns are recorded as new to the district, but I have seen no specimens of them.

I venture again to strongly urge the importance of botanists making full use of the facilities for reference and comparison offered by the National Herbarium before publishing new records. Complete accuracy is difficult enough to obtain when full precautions are taken to avoid error, but it can hardly be expected when the means and materials provided for the purpose of avoiding error are not utilized. As a flora of the Grampians would naturally follow a flora of the Victorian Alps, it is important that the early records should be correct; otherwise it becomes impossible to tell whether the absence of a species from, or its appearance on, a later list is an instance of migration, extinction, or erroneous determination.

From the list of the flora of the Victorian Alps given herewith it will be seen to be more extensive and varied than one might suppose to be the case. It includes, so far as at present determined, 335 species, or nearly one-sixth of the Victorian flora, and no less than fifty-nine natural orders of flowering plants are represented (exclusive of the Coniferæ), though twenty of these by a single species only. No less than forty-six species belong to the Compositæ, while the Leguminosæ include thirty-five species and the Myrtaceæ twenty-seven. These three orders, therefore, comprise very nearly one-third of the whole flora. Other relatively well represented orders are the Umbelliferæ, with ten species; the Proteaceæ, with sixteen species; the Epacridæ, with eleven species; the Orchideæ, with thirteen species; and the Gramineæ, with seventeen species.

The Scrophulariaceæ, the Labiatæ, and the Liliaceæ are each represented by eight species, whereas the Rutaceæ and Cyperaceæ have nine representatives. Of large orders of which relatively few species are present there may be noted the Euphorbiaceæ, with two species, and the Rosaceæ, with three, while such characteristically alpine orders as the Saxifrageæ, Gentianeæ, and Ericaceæ are each represented by a single species only. The ferns, with only fifteen species, cannot be said to be either abundant or varied; but as comparatively little attention was paid to the non-flowering plants, this list may be capable of further extension at a later date.

In the meantime, it is hoped that the list will be of use to visitors desiring to botanize in the magnificent scenery of the Victorian Alps, and will also enable a check to be kept of future records and additions to the flora, which, though not a large one, contains a great variety of interesting forms and several species of very restricted range. Perhaps the most interesting is *Westringia senifolia*, a bushy alpine shrub endemic to Victoria and confined to the Victorian Alps. It is hardly likely that the district contains any species new to science—at least, as regards flowering plants—but close investigation may show the existence of alpine varieties of lowland species not previously noted.

The list of the plants follows beneath in alphabetical arrangement, and is supplemented by a taxonomic list of the orders, showing the number of species represented in each. In addition, a list is given of those species found in flower and fruit of which specimens were taken.

FLORA OF THE VICTORIAN ALPS.

REFERENCES.—F. v. M., F. v. Mueller; St., J. Stirling; Wa., C. Walter; M., J. H. Maiden; B. and S., F. G. A. Barnard and Dr. C. S. Sutton; W., G. Weindorfer; N. H., National Herbarium.

Naturalized aliens are marked with an asterisk.

1. *Acacia alpina*, F. v. M.—St., Wa., M., B. and S., N. H.
2. *A. amœna*, Wendl.—B. and S.
3. *A. Dallachiana*, F. v. M.—F. v. M., N. H.
4. *A. dealbata*, Link.—M., W., N. H.
5. *A. implexa*, Benth.—W.
6. *A. leprosa*, Sieb.—M.
7. *A. melanoxylon*, R. Br.—Wa., W., N. H.
8. *A. mollissima*, Willd.—M.
9. *A. penninervis*, Sieb.—Wa., B. and S., W., N. H.
Var. *falcifolia*,† Wa.
10. *A. pravissima*, F. v. M.—M., B. and S., W., N. H.

† This probably is meant for the var. *falciformis* of Bentham's "Flora."

11. *A. prominens*, Cunn.—B. and S., W., N. H.
12. *A. verniciflua*, Cunn.—B. and S., N. H.
13. *Acæna Sanguisorbæ*, Vahl.—M., N. H.
14. *Aciphylla glacialis*, F. v. M.—St., Wa., B. and S., W., N. H.
15. *A. simplicifolia*, F. v. M.—St., Wa., W., N. H.
16. *Adiantum aethiopicum*, L.—N. H.
Agrostis (*see* *Deyeuxia*).
17. *Alsophila australis*, R. Br.—B. and S., N. H.
18. *Anthistiria ciliata*, Linn. f.—N. H.
19. *Arthropodium paniculatum*, R. Br.—Wa., B. and S., W.
20. *Arundo Phragmites*, L.—N. H.
21. *Aspidium aculeatum*, Sw.—B. and S., N. H.
22. *Asplenium flabellifolium*, Cav.—W., N. H.
23. *A. Trichomanes*, L.—F. v. M.
24. *Astelia alpina*, R. Br.—W., N. H.
Aster (*see* *Celmisia*, *Olearia*).
25. *Asterolasia correifolia*, Benth.—Wa., N. H.
26. *A. Muelleri*, Benth.—F. v. M.
27. *A. trymalioides*, F. v. M.—B. and S., W., N. H.
28. *Astrotricha ledifolia*, D. C.—F. v. M., B. and S., W., N. H.
29. *Atherosperma moschatum*, Lab.—W.
30. *Australina Muelleri*, Wedd.—F. v. M.
31. *Azorella cuneifolia*, F. v. M.—Wa., W.
32. *A. dichopetala*, Benth.—St.
33. *Bæckea crenatifolia*, F. v. M.—Wa., M., B. and S., W., N. H.
34. *B. diffusa*, Sieb.—B. and S., W.
35. *B. Gunniana*, Schau.—St., B. and S., W., N. H.
36. *Banksia collina*, R. Br.—W.
(?) *B. integrifolia*, L. (*see* p. 105).
37. *Bauera rubioides*, Andr.—Wa., N. H.
38. *Bedfordia Salicina*, D. C.—St., W., N. H.
39. *Boronia algida*, F. v. M.—St., M., Wa., B. and S., W., N. H.
40. *Bossiaea bractosa*, F. v. M.—F. v. M., St.
41. *B. buxifolia*, A. Cunn.—F. v. M.
42. *B. foliosa*, A. Cunn.—St., Wa., B. and S., W., N. H.
43. *Brachycome ciliaris*, Less.—B. and S.
44. *B. nivalis*, F. v. M.—F. v. M., St., Wa., B. and S., W.
45. *B. scapiformis*, D. C.—Wa., B. and S., W.
46. *B. scapigera*, D. C.—St.
47. *B. ptychocarpa*, F. v. M.—F. v. M.
48. *Bursaria spinosa*, Cav.—F. v. M., M., B. and S., W., N. H.
49. *Caladenia carnea*, R. Br.—Wa., W.
50. *C. congesta*, R. Br.—Wa.
51. *C. Patersoni*, R. Br.—W.
52. *Callistemon pithyoides*, F. v. M.—M., W.
53. *C. salignus*, D. C.—Wa., N. H.
Var. *Sieberi*, St.

54. *Caltha introloba*, F. v. M.—F. v. M., St., B. and S., W., N. H.
55. *Calycothrix tetragona*, Lab.—W.
Candollea (*see Styliidium*).
56. *Cardamine dictyosperma*, Hook.—St., B. and S., W.
57. *C. hirsuta*, L.—F. v. M.
- 58.**Carduus lanceolatus*, Scop.—M.
- 59.**C. Marianus*, L.—M., N. H.
60. *Carex acicularis*, Boott.—F. v. M., N. H.
61. *C. acuta*, L.—F. v. M., N. H.
62. *C. canescens*, L.—W., N. H.
63. *C. inversa*, R. Br.—F. v. M., N. H.
64. *C. paniculata*, L.—W., N. H.
65. *C. Pseudo-cyperus*, L.—St., N. H.
66. *Cassinia aculeata*, R. Br.—M., W., N. H.
67. *C. longifolia*, R. Br.—M., W., N. H.
68. *Cassytha melantha*, R. Br.—N. H.
69. *Celmisia longifolia*, Cass.—F. v. M., St., Wa., M., W., N. H.
- 70.**Centaurea Calcitrapa*, L.—M., N. H.
71. *Cheilanthes tenuifolia*, Sw.—B. and S., N. H.
72. *Chenopodium murale*, L.—M.
73. *Chiloglottis Gunnii*, Lindl.—W.
74. *Claytonia australasica*, Hook.—F. v. M., St., B. and S., W.,
N. H.
75. *Comesperma ericinum*, D. C.—W., N. H.
76. *C. retusum*, Lab.—St., B. and S., W., N. H.
Commerçonia (*see Ruelingia*).
77. *Coprosma Billardieri*, Hook f.—M., W., N. H.
78. *C. hirtella*, Lab.—St., M., N. H.
79. *C. Nertera*, F. v. M.—W., N. H.
80. *Correa Lawrenciana*, Hook.—St., M., W., N. H.
81. *Cotula filicula*, Hook f.—F. v. M.
82. *Craspedia Richea*, Cass.—St., B. and S., N. H.
Cryptandra (*see Spyridium*).
83. *Cynoglossum suaveolens*, R. Br.—W.
84. *Cyperus eragrostis*, Vahl.—F. v. M., St., N. H.
85. *C. pygmaeus*, Rottb.—F. v. M.
86. *Danthonia pauciflora*, R. Br.—F. v. M.
87. *D. penicillata*, F. v. M.—M., N. H.
88. *D. robusta*, F. v. M.—F. v. M., St., N. H.
89. *Daucus brachiatus*, Sieb.—B. and S.
90. *Davallia dubia*, R. Br.—B. and S.
91. *Daviesia corymbosa*, Sm.—St., M., N. H.
92. *D. latifolia*, R. Br.—W., N. H.
93. *D. ulicina*, Sm.—St., B. and S., W., N. H.
94. *Deyeuxia montana*, Benth.—W., N. H.
95. *D. scabra*, Kth.—F. v. M., M., N. H.
96. *Dianella revoluta*, R. Br.—B. and S.

97. *D. tasmanica*, Hook f.—St., M., W., N. H.
98. *Dichelachne crinita*, Hook f.—N. H.
99. *Dicksonia antarctica*, Lab.—W., N. H.
100. *Dillwynia ericifolia*, Sm.—N. H.
101. *Dipodium punctatum*, R. Br.—M., B. and S., W., N. H.
102. *Dodonæa viscosa*, L.—W.
103. *Drimys aromatica*, F. v. M.—St., B. and S., W., N. H.
104. *Drosera Arcturi*, Hook.—F. v. M., St.
105. *D. binata*, Lab.—F. v. M., W.
106. *D. peltata*, Sm.—B. and S., W.
107. *Echinopogon ovatus*, Beauv.—W.
108. *Epacris heteronema*, Lab.—F. v. M., B. and S., W.
109. *E. microphylla*, R. Br.—St., M., N. H.
110. † *E. paludosa*, R. Br.—N. H. (Wa., B. and S., W.)
111. *E. petrophila*, Hook f.—F. v. M., St.
112. *E. serpyllifolia*, R. Br.—B. and S.
113. *Epilobium glabellum*, Forst.—St., B. and S., N. H.
114. *Erechtites hispidula*, D. C.—Wa., N. H.
115. *E. prenanthoides*, D. C.—N. H.
116. *Erigeron pappochromus*, Lab.—St.
117. *Eriostemon myoporoides*, D. C.—F. v. M., St., M., B. and S., W., N. H. (*See also Asterolasia, Phebalium.*)
118. *Erysimum capsellinum*, F. v. M.—St.
119. *Erythraea australis*, R. Br.—W.
120. *Eucalyptus amygdalina*, Lab.—B. and S., W., N. H.
121. *E. dives*, Schau.—M., N. H.
122. *E. clæophora*, F. v. M.—N. H.
123. *E. globulus*, Lab.—F. v. M.
124. *E. Gunnii*, Hook f.—St., Wa., M., W., N. H.
125. *E. melliodora*, A. Cunn.—W.
126. *E. pauciflora*, Sieb.—St., M., W., N. H.
Var. *alpina*, N. H.
127. *E. rubida*, Deane and Maiden.—N. H.
128. ‡ *E. Sieberiana*, F. v. M.—St., Wa., M., W., N. H.
129. *E. stellulata*, Sieb.—M., N. H.
130. *E. Stuartiana*, F. v. M.—M., N. H.
131. *E. viminalis*, Lab.—M., N. H.

† This plant was recorded as *E. mucronulata* by Wa., B. and S., and W., but specimens from the Walter herbarium on examination proved to be *E. paludosa*. See *Vict. Nat.*, vol. xxiv., p. 87. *E. mucronulata* is restricted to Tasmania. Mr. Maiden confirms this identification.

‡ We have received a specimen of *E. delegatensis*, R. T. Baker, from Mr. Maiden (Mt. St. Bernard, January. 1900). Neither it nor the type can be distinguished from *E. Sieberiana*, F. v. M., except by the fact that this appears to develop a more rugged bark. Hence Baker's species might be regarded as a variety of *E. Sieberiana*. Many foresters call *E. Sieberiana* *E. delegatensis*, and name *E. virgata* (*E. stricta*) as *E. Sieberiana*, following Mueller's error in confusing the two latter species.

132. *Euphrasia collina*, R. Br.—St., B. and S., W., N. H.
133. *Exocarpus cupressiformis*, Lab.—W.
134. *E. stricta*, R. Br.—B. and S., W., N. H.
135. **Festuca bromoides*, L.—N. H.
136. *F. duriuscula*, L.—F. v. M., N. H.
137. *F. Hookeriana*, F. v. M.—W.
138. *Galium australe*, D. C.—W.
139. *G. umbrosum*, Soland.—Wa.
140. *Gastrodia sesamoides*, R. Br.—Wa., W.
141. *Gaultheria hispida*, R. Br.—F. v. M., Wa., B. and S., W.,
 N. H.
142. *Gentiana saxosa*, Forst.—St., W.
143. *Gleichenia circinata*, Sw.—B. and S., N. H.
144. *G. dicarpa*, R. Br.—N. H.
145. *Gnaphalium alpigenum*, F. v. M.—St., Wa., B. and S., W.,
 N. H.
146. *G. japonicum*, Thunb.—N. H.
147. *G. Traversii*, Hook. f.—Wa.
148. *Gompholobium pedunculare*, Lodd.—B. and S., W., N. H.
149. *Goodenia elongata*, Lab.—Wa., B. and S.
150. *G. gracilis*, R. Br.—Wa., W.
151. *G. hederacea*, Sm.—Wa., B. and S., W., N. H.
 Var. *cordifolia*, Wa.
152. *G. humilis*, R. Br.—Wa., W.
153. *Grevillea alpina*, Lindl.—St., M., W., N. H.
154. *G. australis*, R. Br.—St., W., N. H.
155. *G. Miqueliana*, F. v. M.—St.
156. *G. parviflora*, R. Br.—Wa., B. and S., W., N. H.
157. *G. Victoriae*, F. v. M.—F. v. M., Wa., B. and S., W., N. H.
158. *Hakea acicularis*, R. Br.—St., N. H.
159. *H. microcarpa*, R. Br.—St.
160. *Haloragis tetragyna*, R. Br.—W., N. H.
161. *Hardenbergia monophylla*, Benth.—N. H.
162. *Helichrysum apiculatum*, D. C.—N. H.
163. *H. baccharoides*, F. v. M.—St., W., N. H.
164. *H. leucopsidium*, D. C.—B. and S., W., N. H.
165. *H. lucidum*, Henck.—St., Wa., W., N. H.
166. *H. rosmarinifolium*, Less.—St., Wa., B. and S., W., N. H.
167. *H. rutidolepis*, D. C.—N. H.
168. *H. semipapposum*, D. C.—N. H.
169. *H. Stirlingii*, F. v. M.—Wa., B. and S., W., N. H.
170. *Helipterum anthemoides*, D. C.—St., Wa., N. H.
171. *H. incanum*, D. C.—St., N. H.
 Var. *auriceps*, Wa., B. and S.
172. *Herpolorion Novæ-Zelandiæ*, Hook. f.—Wa., W.
173. *Hibbertia Billardieri*, F. v. M.—B. and S.
174. *H. diffusa*, R. Br.—W.

175. *H. obtusifolia*, D. C.—N. H.
 176. *H. serpyllifolia*, R. Br.—F. v. M., W.
 177. *Hierochloe redolens*, R. Br.—F. v. M., N. H.
 178.**Holcus lanatus*, L.—M., N. H.
 179. *Hovea heterophylla*, Cunn.—W., N. H.
 180. *H. longifolia*, R. Br.—St., N. H.
 181. *Huanaca hydrocotylea*, Bth. and Hook f.—W.
 182. *Hydrocotyle hirta*, R. Br.—Wa., W.
 183. *Hymenanthera Banksii*, F. v. M.—W.
 184. *Hymenophyllum tunbridgense*, Sm.—F. v. M.
 185. *Hypericum japonicum*, Thunb.—F. v. M.
 186.**H. perforatum*, L.—M., B. and S., N. H.
 187. *Indigofera australis*, Willd.—St., W., N. H.
 188. *Isotoma axillaris*, Lindl.—F. v. M., W.
 189. *Juncus bufonius*, L.—F. v. M.
 190. *J. communis*, E. Mey.—N. H.
 191. *J. falcatus*, E. Mey.—F. v. M.
 192. *J. pauciflorus*, R. Br.—N. H.
 193. *Kennedyia prostrata*, R. Br.—N. H.
 (*See also Hardenbergia.*)
 194. *Kunzea corifolia*, Reich.—B. and S., W., N. H.
 195. *K. Muelleri*, Benth.—St., Wa., M., B. and S., W., N. H.
 196. *K. parvifolia*, Schau.—W.
 197. *K. peduncularis*, F. v. M.—W.
 Leontopodium (see Raoulia).
 198. *Leptospermum attenuatum*, Sm.—B. and S., N. H.
 199. *L. flavescens*, Sm.—F. v. M., N. H.
 200. *L. myrsinoides*, Sch.—M., B. and S., N. H.
 201. *L. pubescens*, Lam.—M., W., N. H.
 202. *L. scoparium*, Forst.—M., W., N. H.
 203. *Leucopogon collinus*, R. Br.—St.
 204. *L. Macraei*, F. v. M.—F. v. M., St., B. and S., N. H.
 205. *Linum marginale*, Cunn.—F. v. M.
 206. *Lissanthe montana*, R. Br.—St., B. and S., W., N. H.
 207. *Lobelia gibbosa*, Lab.—M., W.
 208. *Logania floribunda*, R. Br.—Wa.
 209. *Lomaria alpina*, Spreng.—F. v. M., Wa., M., B. and S., W.,
 N. H.
 210. *L. discolor*, Willd.—B. and S., N. H.
 211. *Lomatia ilicifolia*, R. Br.—B. and S., W.
 212. *L. longifolia*, R. Br.—F. v. M., St., B. and S., N. H.
 213. *Loranthus celastroides*, Sieb.—N. H.
 214. *L. pendulus*, Sieb.—N. H.
 215. *L. Quandang*, Lindl.—N. H.
 216. *Lotus corniculatus*, L.—W.
 217. *Luzula campestris*, D. C.—W., N. H.
 218. *Lycopodium clavatum*, L.—N. H.

219. *Lyonsia straminea*, R. Br.—W.
 220. *Lythrum Salicaria*, L.—M.
 221. *Marianthus procumbens*, Benth.—Wa.
 222. *Micrantheum hexandrum*, Hook f.—F. v. M., Wa., W., N. H.
 223.* *Mimulus moschatus*, Dougl.—M.
 224. *Mirbelia oxylobioides*, F. v. M.—Wa., N. H.
 225. *Monotoca elliptica*, R. Br.—N. H.
 226. *M. scoparia*, R. Br.—N. H.
 227. *Myosotis australis*, R. Br.—Wa.
 228. *M. suaveolens*, Poir.—F. v. M.
 229. *Olearia argophylla*, F. v. M.—W.
 230. *O. asterotricha*, F. v. M.—W.
 231. *O. exul*, Lindl.—N. H.
 232. *O. florulentus*, F. v. M.—St.
 233. *O. glandulosa*, Benth.—M.
 234. *O. iodochroa*, F. v. M.—St.
 235. *O. megalophylla*, F. v. M.—St., M., B. and S., N. H.
 236. *O. myrsinoides*, F. v. M.—W., N. H.
 237. *O. ramulosa*, Benth.—F. v. M., N. H.
 238. *O. stellulata*, D. C.—M., W., N. H.
 239. *Omphacomeria acerba*, D. C.—W.
 240. *Oreomyrrhis andicola*, Endl.—St., Wa., B. and S., W., N. H.
 241. *O. pulvinifica*, F. v. M.—St., Wa.
 242. *Oreobolus Pumilio*, R. Br.—St.
 243. *Orites lancifolia*, F. v. M.—F. v. M., St., B. and S., W., N. H.
Osmunda (*see* *Todea*).
 244. *Oxylobium alpestre*, F. v. M.—Wa., B. and S., W., N. H.
 245. *O. procumbens*, F. v. M.—Wa., W.
 246. *Panax sambucifolius*, Sieb.—F. v. M., N. H.
 Var. *angustifolius*, N. H.
 247. *Persoonia arborea*, F. v. M.—B. and S.
 248. *P. Chamæpeuce*, Lhot.—Wa., M., B. and S., W., N. H.
 249. † *P. confertiflora*, Benth.—Wa., B. and S., W., N. H.
 250. ‡ *P. juniperina*, Lab.—B. and S., N. H.
 251. *P. rigida*, R. Br.—F. v. M.
 252. *Phebalium phyllicifolium*, F. v. M.—St., B. and S., W.
 253. *P. squamulosum*, Vent.
 Var. *alpinum*.—B. and S., W.

† Mr. Maiden recorded (January, 1900) *Persoonia media* for the same locality as *P. confertiflora*. We have no specimens of *P. media* from a Victorian locality, and it is probably an error for *P. confertiflora*. Mr. Maiden (August, 1910) makes the same correction by letter.

‡ Mr. Maiden recorded *Persoonia revoluta*, of which we have no Victorian specimens; it might possibly be an error for *P. juniperina*, which is not mentioned among the three *Persoonias* recorded by him. The species is given in the census as Victorian, being probably entered by Mueller on account of its appearing close to the Victorian border. Mr. Maiden considers his specimens to be nearer to *P. arborea*, though with smaller perianths and more hairy leaves than is usual in that species.

254. *Pimelea alpina*, F. v. M.—F. v. M.
 255. *P. axiflora*, F. v. M.
 Var. *alpina*—F. v. M., St., Wa., W., N. H.
 256. *P. humilis*, R. Br.—N. H., W.
 257. *P. linifolia*, Sm.—B. and S., W.
 258. *P. curviflora*, R. Br.—W.
 259. *P. ligustrina*, Lab.—St., B. and S., W., N. H.
 260. *P. pauciflora*, R. Br.—M.
 261. *Plantago stellaris*, F. v. M.—Wa.
 262. *Platylobium formosum*, Sm.—W., N. H.
 263. *Poa cæspitosa*, Forst. f.—N. H.
 Var. *alpina*—St.
 264. *Podocarpus alpina*, R. Br.—F. v. M., W.
 265. *Podolepis acuminata*, R. Br.—St., N. H.
 266. *P. longipedata*, Cunn.—Wa., B. and S., W.
 267. *Pomaderris apetala*, Lab.—M., N. H.
 268. *Pomax umbellata*, Sol.—F. v. M.
 269. *Prasophyllum fuscum*, R. Br.—B. and S., W.
 270. *P. patens*, R. Br.—B. and S.
 271. *Prostanthera cuneata*, Benth.—St., Wa., W., N. H.
 272. *P. denticulata*, R. Br.—F. v. M.
 273. *P. hirtula*, F. v. M.—F. v. M.
 274. *P. lasianthos*, Lab.—M., W., N. H.
 275. *P. rotundifolia*, R. Br.—F. v. M., Wa., N. H.
 276. *P. Walteri*, F. v. M.—Wa., B. and S., W.
 277. *Prunella vulgaris*, L.—N. H.
 278. *Pteris aquilina*, L.—N. H.
 279. *Pterostylis cucullata*, R. Br.—Wa.
 280. *P. longifolia*, R. Br.—Wa.
 281. *Pultenæa fasciculata*, Benth.—B. and S., W., N. H.
 Var. *flexilis*, Wa.
 282. *P. Gunnii*, Benth.—W.
 283. *P. hibbertioides*, Hook f.—F. v. M.
 284. *P. mollis*, Lindl.—Wa., W., N. H.
 285. *P. subumbellata*, Hook.—St.
 286. *Ranunculus anemoneus*, F. v. M.—F. v. M., St., Wa.
 287. *R. Gunnianus*, Hook.—F. v. M., St., Wa.
 288. *R. lappaceus*, Sm.—F. v. M., St., W.
 289. *R. Millani*, F. v. M.—St.
 290. *R. Muelleri*, Benth.—W.
 291. *Raoulia catipes*, Hook f.—St., Wa., B. and S., N. H.
 292. *Restio australis*, R. Br.—St., N. H.
 293. *Richea Gunnii*, Hook f.—St., Wa., B. and S., W., N. H.
 294. **Rosa rubiginosa*, L.—M., N. H.
 295. **Rubus fruticosus*, L.—M., N. H.
 296. *Ruelingia pannosa*, R. Br.—F. v. M.
 297. *Scævola Hookeri*, F. v. M.—B. and S., N. H.

298. *Scleranthus biflorus*, Hook f.—F. v. M., St., Wa., W., N. H.
 299. *S. mniarioides*, F. v. M.—St.
 300. *Senecio australis*, A. Rich.—St., M., N. H.
 301. *S. pectinatus*, D. C.—St., Wa., B. and S., W.
 (See also *Bedfordia*.)
 301A. *Spiranthes australis*, Lind.—B. and S., W.
 302. *Spyridium parvifolium*, F. v. M.—W.
 303. *Stackhousia linarifolia*, Cunn.—Wa.
 304. *S. pulvinaris*, F. v. M.—St., Wa.
 305. *S. viminea*, Sm.—Wa., W.
 306. *Stellaria pungens*, Brong.—F. v. M., M., N. H.
 307. *Stipa setacea*, R. Br.—N. H.
 308. *Stylidium graminifolium*, Sw.—St., M., B. and S., N. H.
 309. *Styandra cæspitosa*, R. Br.—W.
 Var. *alba*, Wa.
 Styphelia (see *Leucopogon*, *Lissanthe*, *Monotoca*).
 310. *Tecoma australis*, R. Br.—F. v. M.
 311. *Tetradlea ciliata*, Lindl.—Wa., W.
 312. *T. ericifolia*, Sm.—W.
 313. *Thelymitra ixioides*, Sw.—W.
 314. *T. longifolia*, R. and G. Forst.—B. and S.
 315. *Thysanotus Patersoni*, R. Br.—Wa.
 316. *T. tuberosus*, R. Br.—Wa., W.
 317. *Todea barbara*, T. Moore.—W.
 318. *Trachymene Billardieri*, F. v. M.—F. v. M., Wa., B. and S., W., N. H.
 319. *Trisetum subspicatum*, Pal.—F. v. M., St., W., N. H.
 320. *Typha angustifolia*, L.—B. and S.
 321. *Usnea barbata*, Fr. (Lichen)—N. H.
 322. *Utricularia dichotoma*, Lab.—Wa., W.
 323.**Verbascum Blattaria*, L.—M.
 324. *Veronica calycina*, R. Br.—F. v. M., Wa.
 325. *V. Derwentia*, L'john.—St., B. and S., W., N. H.
 326. *V. nivea*, Lindl.—Wa., W.
 327. *V. perfoliata*, R. Br.—St., Wa., N. H.
 328. *V. serpyllifolia*, L.—F. v. M., St.
 329. *Viola betonicifolia*, Sm.—Wa., W.
 330. *V. Caleyana*, G. Don.—St.
 331. *V. hederacea*, Lab.—W.
 332. *Wahlenbergia gracilis*, D. C.—M., B. and S., W., St., N. H.
 333.†*Westringia senifolia*, F. v. M.—F. v. M., St., M., Wa., B. and S., W., N. H.
 334. *Zieria Smithii*, Andr.—W.

† Endemic to Victoria and peculiar to the district.

[NOTE.—The apparent discrepancies in the records are occasioned by the fact that the several observers visited the Alps at different seasons and recorded only the more noticeable plants.—ED. *Vict. Nat.*]

NATURAL ORDERS ARRANGED SYSTEMATICALLY ACCORDING TO
MUELLER'S SECOND CENSUS OF AUSTRALIAN PLANTS.

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Gramineæ, 18, 20, 86, 87, 88, 94, 95, 98, 107, *135, 136, 137, 177, *178, 263, 307, 319	Filices, 16, 17, 21, 22, 23, 71, 90, 99, 143, 144, 184, 209, 210, 278, 317
Coniferæ, 264	Lichens, 321

Among others, the following were found in flower :—20, 120, 121, 123, 124, 126, 127, 129, 130, 131, 157, 163, 166, 167, 175, 179, 191, 206, 213, 214, 215, 225, 226, 277, 298.

And the following in fruit :—78, 103, 114, 120, 121, 123, 124, 126, 127, 129, 130, 131, 158, 198, 199, 200, 201, 202, 212, 213, 214, 215, 218, 243, 249, 294, 325.

Introduced plants are numbers 58, 59, 70, 178, 186, 223, 294, 295, 323.

BOTANICAL REPORT BY J. W. AUDAS.

From Porepunkah, which is about 920 feet above sea level, and the nearest railway station to the Eurobin Falls, there is a fairly good road leading to the summit of the Buffalo Mountain. some 3,500 feet higher. Along the Eurobin Creek, which runs at the base of the range, fine specimens of *Eucalyptus amygdalina* and *E. viminalis* were seen, some of which reached a height of 150 feet, with a circumference at the base of 25 feet. The following shrubs were also observed along the Buffalo Range :—*Bæckeia crenatifolia*, *B. Gunniana*, *Trachymene Billardieri*, *Prostanthera cuneata*, *Lomatia longifolia*, *Micrantheum hexandrum*, *Mirbelia oxylobioides*, *Kunzea corifolia*, *Pultenæa mollis*, *P. fasciculata*, *Hovea longifolia*, *Grevillea parviflora*, and *Bauera rubioides*. Only a small volume of water was coming over the Buffalo Gorge, owing to the fact that the Government authorities were engaged forming a lake, which is intended for the purpose of providing ice-skating in winter.

The township of Bright lies about ten miles to the east of the Buffalo Mountains, and has an elevation of just 1,000 feet. The eucalypts growing in the vicinity embrace the following species :—*E. amygdalina*, *E. Gunnii*, *E. viminalis*, *E. rubida*, *E. elæophora*, *E. Stuartiana*, *E. pauciflora*, and *E. stellulata*. the one most in evidence being *E. viminalis*, the Manna Gum, which in nearly every instance is the host of the parasitical Mistletoe, *Loranthus pendulus*. Scarcely a single tree is free from this pest ; several species are attacked by it, but in a lesser degree than *E. viminalis*.

Worthy of mention also are the wattles, which will be a mass of glorious blossom in about a month's time. Two species are very numerous—the Silver Wattle, *Acacia dealbata*, and the Ovens Wattle, *A. pravissima*. The former, unfortunately, is subject to infestation by a lichen, *Usnea barbata*, which may

possibly be partially parasitic, since many badly infested limbs seem to suffer and die. On the other hand, the Ovens Wattle is affected to a great extent by *Loranthus Quandang*, a species of mistletoe somewhat similar in form to that seen on the eucalypts, but of a light grey colour.

Numerous introduced plants abound, such as the St. John's Wort, which flourishes abundantly in neglected cultivated soil, as well as on the thinly-wooded hillsides. The Blackberry, *Rubus fruticosus*, has taken possession of the river banks and all moist places. The Sweet Briar, *Rosa rubiginosa*, has established itself extensively on all sides, while the Star Thistle, *Centaurea Calcitrapa*, is to be found growing thickly in patches on the dredged flats, in company with the Spotted Thistle, *Carduus Marianus*, showing the necessity for the appointment of a thistle inspector.

The Willow Herb, *Epilobium glabellum*, flourishes on the flats. Rabbits must be a terrible pest; they can be seen by the hundred on the journey from Bright to Harrierville. Foxes also seem plentiful, as I saw several during my trip, including one which carried a steel trap on one of his forelegs.

Before reaching the township of Harrierville, a fine specimen of the Manna Gum, *E. viminalis*, was seen on the roadside, the basal girth of this tree being fully 30 feet. Harrierville is about sixteen miles from Bright, and in that distance another 500 feet of elevation is gained. A steep and winding road connects Harrierville and the St. Bernard Hospice, about twelve miles distant. The first plant to attract attention was the so-called "sarsaparilla plant" of the bushman—*Hardenbergia* (*Kennedyia*) *monophylla*—which was already in bloom. The stems of this twiner had reached extraordinary dimensions, being in some cases two or three inches in diameter, and winding round the young eucalypts from the base to the topmost branch. This climber is well worthy of cultivation, as I have observed that the raceme of bloom is far richer under cultivation. A parasitical creeper, *Cassytha melantha*, was also to be seen spreading from one tree-top to another.

The Victorian Elderberry Ash, *Panax sambucifolius*; the Broad-leaved Native Hop, *Daviesia latifolia*; the Blackwood, *Acacia melanoxylon*, locally called "Lightwood," and the Native Cherry, *Exocarpus stricta*, were met with further on. *Hovea heterophylla*, a very pretty shrub of only a foot or so in height, next attracted attention. This is sometimes erroneously called "Native Violets"—an exceedingly inappropriate name, as the flowers resemble violets in nothing whatsoever except colour, and the plant is, in reality, one of the immense order of Leguminosæ, or pea-flowers.

Still further ascending this steep and winding incline,

Hibbertia obtusifolia, with its bright yellow flowers, added a note of colour. Close by were two Epacrids—*Monotoca* (*Styphelia*) *elliptica* and *M. (S.) scoparia*—which were also in flower. The grass on the roadside consisted mainly of *Poa cæspitosa* (with stems in some cases exceeding three feet in height), *Deyeuxia* (*Agrostis*) *scabra*, and the Wallaby Grass, *Danthonia penicillata*. A short distance further on dead spikes of the leafless orchid, *Dipodium punctatum*, were observed.

About three miles from Harrietville, adjacent to a spring, specimens of *Eucalyptus dives* were seen. These are small trees resembling the Peppermint Gum, *E. amygdalina*, in foliage, but they grow only to a height of 25 or 30 feet. The following Proteaceæ were met with:—*Persoonia confertiflora* (which was in fruit), *P. Chamæpeuce*, *Hakea acicularis*, *Lomatia longifolia* (fully 20 feet in height), and *Grevillea Victoriæ*, which was well advanced towards blooming. The latter shrub may be found up to an elevation of 5,000 feet. Small plants of St. John's Wort were noticed at the elevation of 3,000 feet.

Higher up, an exceedingly fine forest, chiefly of Mountain Ash, *E. Sieberiana*, was passed through, which extends to within half a mile of the St. Bernard Hospice, 5,000 feet above sea level. In some cases the trees attain a height of 150 feet. A pretty shrub, *Eriostemon myoporoides*, well worthy of cultivation (locally called "Wild Daphne"), grows on the banks of the road extending to the Hospice, and is in bloom for fully six months of the year, according to local residents; also *Helichrysum rosmarinifolium*, displaying an inflorescence of small white flowers, abounds, and likewise grows at an elevation of 5,000 feet.

In these high altitudes snow had already fallen, completely covering much of the vegetation and extending to the summits of Mounts Hotham and Feathertop. Here and there, in drifts, it was found to be three or four feet in depth. A rather novel sight was the number of grasshoppers jumping about in the snow: probably they had made their way through from the covered vegetation. Specimens forwarded to Mr. C. French, F.L.S., Government Entomologist, have been identified as *Trigoniza maculata*, Tepper.

The flora of Mounts Hotham and Feathertop consists chiefly of stunted vegetation. The only eucalypts found in these high elevations are the Snow Gum, *E. pauciflora*, var. *alpina*, and the Cider Gum, *E. Gunnii*. These gradually become more and more stunted, and finally disappear on the highest ridges. Other shrubs of the Myrtle family found on these alpine regions are *Kunzea Muelleri*, a low, heath-like, bushy shrub with yellow flowers, and a dwarfed form of *Callistemon salignus*.

The shrubs *Prostanthera lasianthos*, *Coprosma hirtella*, *Pimelea axiflora*, and *Drimys aromatica*, and the ferns *Adiantum*

aethiopicum, *Aspidium aculeatum*, and *Lomaria discolor*, which are common in the hills and fern gullies of the Dandenong Ranges, are also met with on these table-lands. Other plants familiar to Melbourne botanists which occur on these high plateaux are:—*Gompholobium pedunculare*, *Platylobium formosum*, *Persoonia juniperina*, *Daviesia ulicina*, *Indigofera australis*, *Pimelea ligustrina*, *Olearia* (Aster) *stellulata*, *O.* (A.) *myrsinoides*, *O.* (A.) *ramulosa*, *Euphrasia collina*, *Epilobium glabellum*, *Stellaria pungens*, *Dianella tasmanica*, *Helipterum incanum*, *Helichrysum apiculatum*, *H. semipapposum*, *H. rutidolepis*, *H. leucopsidium*, *Stylidium* (Candollea) *graminifolium*, *Veronica Derwentia*, *Craspedia Richea*, *Gnaphalium japonicum*, *Wahlenbergia gracilis*, *Asplenium flabellifolium*, *Danthonia penicillata*, *Anthistiria ciliata*, *Stipa setacea*, *Dichelachne crinita*, *Poa cæspitosa*, *Festuca bromoides*, *Carex inversa*, and *Luzula campestris*.

Among the plants not found at low altitudes, the following may be mentioned:—*Oxylobium alpestre*, *Trisetum subspicatum*, *Carex canescens*, *Richea Gunnii*, *Boronia algida*, *Astelia alpina*, *Orites lancifolia*, *Celmisia longifolia* (Aster *celmisia*), *Lomaria alpina*, *Olearia* (Aster) *exul*, *Acacia alpina*, *Raoulia* (Leontopodium) *catipes*, *Caltha introloba*, *Leucopogon* (Styphelia) *Macraei*, *Westringia senifolia*, *Helichrysum baccharoides*, *H. Stirlingii*, *Gnaphalium alpigenum*, *Lissanthe* (Styphelia) *montana*, *Aciphylla simplicifolia*, and *Gaultheria hispida*, the latter being one of the only two representatives in Victoria of the Ericaceæ.

Two other interesting species are *Aciphylla glacialis*, a herbaceous perennial plant belonging to the Umbelliferae, which grows in great abundance on Mount Hotham, at an elevation of over 6,000 feet, somewhat resembling grass, and locally known as "bayonet grass"; and *Scleranthus biflorus*, belonging to the order Caryophyllæ, which is met with in patches, and has the appearance of tufts of moss.

The only birds seen were a few Eaglehawks hovering about the mountain-tops, though lower down King and Lory Parrots were plentiful.

THE LATE F. R. GODFREY.—It is with regret we record the death of Mr. F. R. Godfrey. He was elected a member of the Club in July, 1883, and was thus a very old supporter. He contributed one paper, entitled "Surface Shells" (*Vict. Nat.*, v., 91), in which he described, in a popular way, some of the minute forms of life found at times floating on the surface of the ocean. He was keenly interested in ornithological matters, and was for many years a leading spirit in the management of the Melbourne Zoological Gardens.

The Victorian Naturalist.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 10th October, 1910.

The president, Mr. F. Wisewould, occupied the chair, and about 85 members and friends were present.

CORRESPONDENCE.

From the Chief Inspector of Fisheries and Game, in reply to a communication from the Club, asking whether the Club desired steps to be taken for proclaiming the southern portion of the Dandenong State Forest, including the watersheds of Monbulk and Hardy's Creeks, a sanctuary for birds and native animals. It was resolved, on the motion of Messrs. Keartland and Barnard, that it is desirable that the area referred to be proclaimed a sanctuary.

REPORTS.

A report of the excursion to Studley Park on Saturday, 17th September, was given by the leader, Dr. C. S. Sutton, who reported that an interesting afternoon had been spent in botanically exploring the steep Silurian slopes of the Park, where, owing to the difficulty of access, the vegetation had not suffered so much as in other parts. Among the plants noted were *Acacia acinacea*, which makes a very fine show in certain parts of the Park at this time of year.

A report of the excursion to Bayswater on Saturday, 24th September, was forwarded by Mr. R. W. Armitage, who stated that, unfortunately, the leader, Mr. C. F. Cole, had been unable to be present; and, as none of the twenty-five members present were conversant with the locality, the results were probably not as good as they might have been. The afternoon was set down for ornithology, and, though a fair number of birds were seen, there were none of any great rarity. He was indebted to Mr. W. J. Stephen for the following list of birds seen, viz.:—Pallid Cuckoo, House Swallow, Brown Flycatcher, Black and White Fantail, Black-faced Cuckoo-Shrike, White-throated Caterpillar-eater, Brown Tit, Yellow-rumped Tit, White-browed Wood-Swallow, Grey Shrike-Thrush, Magpie-Lark, White-backed Magpie, Frontal Shrike-Tit, Rufous-breasted Thickhead, White-throated Tree-creeper, Orange-tipped Pardalote, White-plumed Honey-eater, Red Wattle-bird, Olive-backed Oriole, and Great Brown Kingfisher.

A report of the excursion to Cheltenham on Saturday, 8th

October, was given by the leader, Mr. J. R. Tovey, who reported an attendance of about a dozen members, who spent a very pleasant afternoon, during which some sixty interesting plants were noted in flower or fruit.

A report of the junior excursion to Black Rock on Saturday, 1st October, was given by Mr. G. A. Keartland, who kindly acted as leader in the absence of Mr. C. Barrett. He said that an instructive afternoon had been spent, but that the juniors had yet to learn that to observe birds in their haunts both quiet and patience are essential.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. L. Van den Houten, Salisbury-street, Caulfield, was duly elected an ordinary member, and Miss Grace Thomas and Masters Eric Box, Noel Box, and George Jensen, all of Footscray, were elected as junior members.

PAPERS READ.

1. By Mr. J. C. Goudie, entitled "The Coleoptera of North-Western Victoria (Part II.)"

The author dealt with the water-beetles of the Birchip-Sea Lake district, remarking that, while Masters recorded 261 species for the whole of Australia, and Mr. A. M. Lea had recorded 27, of which 7 were endemic, for Tasmania, he was able to record 17 named species for the district, while there are three others which have yet to be determined. Interesting notes were appended to each species.

2. By Dr. C. S. Sutton, entitled "Notes on the Sandringham Flora."

The author drew attention to the many interesting characteristics of the flora of the Sandringham district—a district which, unfortunately, owing to the spread of population, will soon be lost to the botanical student. The flora was a very extensive one, and in a favourable season it was possible to collect at least one hundred species of plants in bloom in the course of a single day's ramble. It was also noticeable that the association of plants met with at Sandringham occurred in several more or less isolated places in the State.

Some little discussion followed, during which Mr. F. G. A. Barnard said that the author was to be thanked for the interesting way in which he had referred to the characteristic features of the Sandringham flora.

EXHIBITS.

The exhibits consisted almost entirely of wild-flowers, which are recorded under a separate heading.

The meeting closed with an extended conversazione.

EXHIBITION OF WILD-FLOWERS.

IN the long series of years during which the Field Naturalists' Club of Victoria has been holding its annual exhibition of wild-flowers, it has seldom experienced more unfavourable weather for collecting the specimens than on the present occasion. This was the more unfortunate because arrangements had been made for keeping the exhibition open on the Tuesday afternoon and evening, in addition to the night of the ordinary meeting, Monday, 10th October. Under these circumstances, the display, though very creditable, was not nearly so extensive as it was hoped it would have been, many members having had to forego entirely the collecting trips they had planned, as also their friends in the country.

The excellent display of cultivated native plants made by the Director of the Melbourne Botanic Gardens, Mr. J. Cronin, however, helped to make up for the absence of some of the expected exhibits from other quarters. About forty species were exhibited, among which may be mentioned:—*Acacia salicina*, *Bauera rubioides*, var. *alba*, *Dendrobium speciosum*, *Epacris longiflora*, *Grevillea confertifolia*, *G. Miqueliana*, *Hakea microcarpa*, *Kunzea coriifolia*, *Livistona australis*, *Pittosporum phylliræoides*, *Psilotum triquetrum*, and *Westringia glabra*.

The following were the principal exhibitors, with some of the more notable species shown:—

By Mr. J. W. Audas.—About 40 species from Ringwood, including *Billardiera scandens*, *Cryptandra Hookeri*, *Acacia juniperina*, *Comesperma ericinum*, *Lyperanthus nigricans*, *Caladenia congesta*, *Thelymitra antennifera*, &c.

By Mr. A. G. Campbell.—About 25 species from the Grampians, including *Daviesia latifolia*, *Pultenæa mollis*, *Hakea rostrata*, *Calycotrix tetragona*, *Grevillea oleoides*, *G. alpina*, *G. aquifolium*, *G. ilicifolia*, *Thryptomene Mitchelliana*, *Prostanthera rotundifolia*, *Dillwynia hispida*, *Stackhousia viminea*, &c.

By Miss S. Cochrane.—About 25 species from Benalla, including *Grevillea alpina*, *Brachyloma daphnoides*, *Vellea paradoxa*, *Caladenia congesta*, *C. carnea*, *Calochilus Robertsoni*, &c.; about 20 species from Blackburn, including *Indigofera australis*, *Dillwynia ericifolia*, *Pterostylis longifolia*, *P. nutans*, &c.

By Messrs. Gabriel and Stout.—About 25 species from Oakleigh, including *Kennedyia prostrata*, *Brunonia australis*, *Lyperanthus nigricans*, *Thelymitra antennifera*, &c.

By Mr. G. Hill.—About 10 species from Ararat, including *Grevillea alpina*, *Correa speciosa*, *Tetralthea ciliata* (very fine), *Stypandra glauca*, *Thryptomene ericæa*, *Dillwynia hispida*, &c.

By Mr. R. Kelly.—About 30 species from Healesville, in-

cluding *Eriostemon corneifolius*, *Astrotricha ledifolia*, *Pittosporum bicolor*, *Glycine clandestina*, *Grevillea alpina*, *Hymenanthera Banksii*, *Pterostylis cucullata*, *P. pedunculata*, *Caladenia menziesii*, *Chiloglottis Gunnii*, &c.

By Miss Montgomery.—About 25 species from Echuca, including *Lavatera plebeja*, *Podolepis acuminata*, *Vellea paradoxa*, *Helipterum corymbiflorum*, *Prasophyllum patens*, *Swainsona procumbens*, &c.

By Dr. Sutton.—About 50 species from Sandringham, including *Comesperma volubile*, *C. calymega*, *Haloragis tetragona*, *Pultenæa paleacea*, *Limnanthemum exaltatum*, *Apium prostratum*, *Lasiopetalum Baueri*, *Alyxia buxifolia*, *Myoporum insulare*, *Calocephalus Brownii*, &c.

By Mr. J. R. Tovey.—About 30 species from Mentone, including *Aolus villosa*, *Prasophyllum elatum*, *Burchardia umbellata*, &c.

EXCURSION TO STUDLEY PARK

TEN members attended the excursion to Studley Park on 17th September, meeting at the Johnston-street Bridge, and scrambling along the left bank of the river in the direction of Richmond. The day was pleasant, and the flora sufficiently varied to be interesting. On account of the steepness of the river bank in this part, the vegetation remains in a condition somewhat resembling its virgin state, and quite a number of shrubs which one would hardly expect to find so close to the city (just two and a half miles from the G.P.O.) were found growing luxuriantly. The most prevalent were, roughly in order:—*Dodonæa viscosa*, with purplish-red masses of fruit; *Kunzea peduncularis*, *Hymenanthera Banksii*, *Pomaderris apetala*, *Bursaria spinosa*, *Melaleuca ericifolia*, *Callistemon salignus*, *Coprosma Billardieri*, *Myoporum viscosum*, *Acacia acinacea* (in great profusion), *A. pycnantha*, *A. decurrens*, and *Exocarpus cupressiformis*. Among smaller plants may be mentioned *Dianella revoluta*, *Indigofera australis*, *Nicotiana suaveolens*, and *Clematis microphylla*.

At the kind invitation of Mr. Gabriel, the party climbed the bank, passing the fish-ponds, and took tea at his house, overlooking the footbridge leading to Victoria-street; and, much refreshed, afterwards crossed Studley Park-road into the Park above the Falls, exploring another steep bank at the far end of the reserve. Nothing, however, was noticed here that had not been previously seen, and the party soon made its way back to the city in good time, after spending a very pleasant afternoon.—C. S. SUTTON.

EXCURSION TO CHELTENHAM.

ABOUT a dozen members took part in the excursion to Cheltenham on Saturday, 8th October. The party, on leaving the station, passed through the Cemetery grounds, where several of the Black Sheoak, *Casuarina suberosa*, Otto and Dietr., were found to be infested with the mistletoe, *Loranthus celastroides*, Sieb., which is slowly but surely killing the trees. A fine cultivated specimen of the "Lilly-pilly," *Eugenia Smithii*, Poir., was seen in fruit. We also noticed how the South African irids, *Sparaxis tricolor*, Ker Gawl (*Ixia*, sp.), and *Homeria collina*, Vent. (Cape Tulip), had escaped from cultivation and were establishing themselves among the grass in the unused parts of the Cemetery. Several native plants were noticed in flower within the enclosure. As we wended our way through the Cheltenham Park, quite a large number of native plants were noted, and it was remarked that this park would be a suitable place for the conservation of the native flora of the district, more especially as the adjoining land is gradually being brought under cultivation, or being used for residential purposes. However, I understand the park is to be converted into golf links, which will probably put an end to the native plants. The coast tea-tree, *Leptospermum lævigatum*, F. v. M., and the small tea-tree, *Leptospermum myrsinoides*, Sieb., were covered with white bloom, and at a distance gave one the idea that there had been a recent fall of snow. The Wedding-bush, *Ricinocarpus pinifolius*, Desf., was met with in great profusion. The Blue Squill, *Chamæscilla corymbosa*, F. v. M., looked charming among the grass and undergrowth. The white-flowered form was not noticed. Of the Leguminosæ, which is well represented in this district, *Aotus villosa*, Sm., Hairy Aotus; *Pullenaea paleacea*, Willd., Chaffy Bush Pea; *Daviesia ulicina*, Sm., Gorse Bitter Pea; *Dillwynia cinerascens*, R. Br., Grey Parrot Pea; *Acacia oxycedrus*, Sieb., Spike Acacia, might specially be mentioned. Three members of the rice-flower, *Pimelea*, were noted in flower—*P. humilis*, R. Br., *P. phyllicoides*, Meiss., and *P. octophylla*, R. Br. Several representatives of the Orchidaceæ were met with, including *Caladenia Patersoni*, R. Br., Spider Orchid; *C. carnea*, R. Br., Pink Fingers; *Thelymitra antennifera*, Hook f.; *Lyperanthus nigricans*, R. Br.; *Glossodia major*, R. Br.; and *Prasophyllum elatum*, R. Br. In all, fully sixty species were noted in flower or fruit. Of these the following might be mentioned:—*Hakea pugioniformis*, Cav.; *Burchardia umbellata*, R. Br., Milkmaids; *Arthropodium strictum*, R. Br.; and *Comesperma volubile*, Lab., Love Creeper. A few patches of the Wild Parsnip, *Didiscus pilosus*, Benth., were also observed. This plant is generally credited with poisonous properties, but investigations have not

yet led to a decisive conclusion. Several introduced plants were noted, including the Cape-weed, *Cryptostemma calendulaceum*, R. Br. These were found where the ground had been cultivated or disturbed and then neglected; but wherever it was left in the natural state no alien flora were noticed. On reaching the top of a small hill a fine view of the surrounding country was obtained, and expressions of regret were made that this splendid collecting-ground, so close to Melbourne, and which contains so much of our native flora, was gradually being alienated, and that nature-students will, before long, have to go further afield. After an enjoyable afternoon, the party left Cheltenham by the 5.30 p.m. train *en route* for their respective homes.—J. R. TOVEY.

THE LATE J. R. Y. GOLDSTEIN.—Though not a member in recent years, the late Lieut.-Colonel Goldstein, whose death took place on 22nd September, was one of the original members of the Club, and served on the first committee. He acted as one of the vice-presidents during the next two years. However, a military spirit overcame the scientific tendency, and of late years he had not taken much interest in natural history. He gave several addresses on elementary biology at the earlier meetings, and was an expert microscopist, for a time acting as hon. secretary of the former Microscopical Society.

AUSTRALIAN BEES.—A short article in the *Annals and Magazine of Natural History* for October, 1910, by T. D. A. Cockerell, of the University of Colorado, entitled "Descriptions and Records of Bees," contains descriptions of ten new species of bees, eight of which are from Queensland, collected by Dr. Turner, of Brisbane, at various ports up the coast, and forwarded to the British Museum. Another species, for which a new genus is founded, is named *Euryglossidia rectangulata*, and bears the record "Hab., Victoria (C.F., Feb., 1901; Turner Collection)."

THE CITRUS MEALY BUG.—*The Pomona* (California) *College Journal of Entomology* for September, 1910, gives the results of a number of experiments made with the view of discovering a cheap and effective remedy for the mealy bug on citrus trees. The best remedy was found to be a carbolic acid emulsion made by dissolving 40 lbs. of whale-oil soap (light-coloured) in 40 gallons of hot water, and then adding 5 lbs. of crude carbolic acid, bringing the whole to the boil for a few minutes to ensure thorough mixing. This stock solution is used for spraying at the rate of one part to twenty of water. The resultant spray has many points to recommend it, and has been found effectual against insects which are protected by a woolly, cottony, or waxy covering.

THE ROMANCE OF PLANT PATHOLOGY.

BY D. McALPINE, Government Vegetable Pathologist.

(Read before the Field Naturalists' Club of Victoria, 8th August, 1910.)

ONE would hardly imagine that a serious science such as plant pathology, dealing as it does with diseases which sometimes ravage the farmer's crops and ruin his prospects for the season, would have the slightest suspicion of romance about it; and yet, during an experience of over twenty years in Australia, I have had numerous instances where the element of humour was certainly not wanting. The general impression is that the subject of disease does not lend itself to anything approaching levity, and when one is engaged in investigating what might be called the shady side of plant life, there is only the hard wrestling with unpleasant facts and with malodorous specimens which have to be accounted for, and possibly to assign the cause to some insect or fungus with a high-sounding scientific name—the very reverse of what we usually associate with light literature. But even the plant pathologist has his compensations in meeting with really interesting experiences, and I propose to give a few instances which have occurred in my own work, and I hope to treat them in such a way that they will illustrate that combination which is so rare in scientific literature—the blending of instruction with amusement.

It would appear that botanists, among scientific men, are pre-eminently endowed with the saving sense of humour, which is said to be simply another name for a sense of the fitness of things. In a recent number of *Nature* (26th May) it is stated that "botanists alone, so far as we are aware, have a journal dealing purely with the jests and humours of their subject. The first number of the *Sportophyte*, edited by Dr. Marie Stopes, emanates from Manchester University, and is to appear yearly. It contains anecdotes, verse, and articles parodying serious journals, of which the highly technical and friendly humour will appeal to professional botanists." When a journal emanating from a university has the courage to do this, I thought perhaps that a Field Naturalists' Club might not look too severely on a departure from the time-honoured custom of being highly technical and deadly dull, and the following illustrative examples are offered.

RED SPOTS IN BREAD AND FLOUR.

Only last month I received from a leading miller in the country a sample of flour with red spots through it, and it was sent to me evidently for the purpose of settling a dispute, as a neighbouring manager contended that it was due to the ink used in branding. Some of you may have observed these spots scattered over the bread or appearing in the flour, and millers and bakers

are much annoyed by such appearances. The trouble is sometimes attributed to the red dye used in branding bags; but a miller naïvely remarked to me that this could not be the cause, as red spots appear in flour from mills where the bags are branded blue. It is now known to be due to a microbe called *Bacillus prodigiosus*, the specific name being given on account of the minute size of the organism. The cell contents form a blood-red colouring matter, which is insoluble in water but soluble in alcohol, and it resembles certain aniline dyes in many of its reactions. This microbe is always present in the atmosphere, and, since it may arise in the course of a single night as blood-red slimy drops on stale bread, boiled potatoes, &c., this has given rise to the stories of "bleeding bread," "bloody sweat," "blood rain," &c.

Dr. Bull, in his lecture on "The World without Microbes," has given a very vivid picture of the work done by these tiny organisms, and the possible failure of our food supply in their absence. He classified them as the "criminal microbes," producing disease and death, and the "artisan microbes," working ceaselessly and rendering possible the existence of plants and animals; but he omitted to mention the miracle-working microbe, as this one has produced the "bleeding Host"—the consecrated bread of the Eucharist.

Professor Trouessart, in his work in the International Scientific Series, entitled "Microbes, Ferments, and Moulds," refers to it as follows:—"Many phenomena which have struck the imagination of ignorant and credulous people are merely due to the presence of these coloured microbes. In 1819, a peasant of Liguara, near Padua, was terrified by the sight of blood-stains scattered over some polenta which had been made and shut up in a cupboard on the previous evening. Next day similar patches appeared on the bread, meat, and other articles of food in the same cupboard. It was naturally regarded as a miracle and warning from heaven, until the case had been submitted to a Paduan naturalist, who easily ascertained the presence of a microscopic plant, which Ehrenberg likewise found at Berlin under analogous circumstances, and which he named *Monas prodigiosa*."

With reference to polenta, it may be mentioned, in passing, that it is attracting a good deal of attention at the present time as the probable cause of the disease pellagra. This disease is a very serious one, and occurs chiefly in Italy, as well as numerous other countries, and it has hitherto been attributed to eating damaged maize, which is so largely consumed as "polenta," the porridge of Italy. There is a Pellagra Investigation Committee formed in London, and the field commission at present in Italy consider that a parasite is the cause.

In 1843 it likewise appeared in the military barracks in the vicinity of Paris, and even the stout-hearted soldiers were dismayed when they saw the bread supplied to them with reddish spots. This "bleeding bread" was regarded as an evil omen, according to the superstition of the period, and was the cause of serious riots. In Victoria it is occasionally found on cheese or milk that has been exposed to a contaminated atmosphere, but I have not heard of any serious consequences arising from it. These organisms are considered to be harmless, and it is only their blood-red appearance which makes them look so formidable and so suggestive of evil.

Although this microbe is one of the most minute, it has created no little stir in the world, and it has at least taught us the lesson that just as "all is not gold that glitters," so all is not blood that appears in the form of red drops or streaks.

A NEW VARIETY OF WHEAT (?).

A farmer of South Australia noticed in his wheat crop in 1892 an ear different in appearance from the others, and he preserved it, thinking it to be a new variety; but it was brought under the notice of the late A. Molineaux, Secretary to the Agricultural Bureau, who forwarded it to me, and on examining the grains I recognized at once the appearance familiar to me in boyhood, and named "ear-cockle," or "peppercorn," or "silver grain," from the silvery appearance inside.

Instead of having a new variety of wheat, the farmer had a disease in his grain, and this was evident even to the naked eye, from its small size and black colour. In fact, this little black body is not a grain at all, but a gall which replaces the grain, and it is formed by an eel-worm, just as the potato blister is. You are all familiar with the "vinegar" or "paste" eels, and this one is a near relative. It has been known since 1745, and received the name of ear-cockle from its resemblance to the seeds of the well-known plant called "corn-cockle." Inside the gall there is a white, woolly mass, which is easily removed, and this consists of hundreds of eel-worms of all sizes. These little animals have become rather celebrated on account of the wonderful property they possess of remaining dormant and death-like for a number of years, and then reviving in the presence of moisture. They have been known to become active after being dormant for 27 years; and what a wonderful vitality they must possess, notwithstanding their minute size, to remain in a death-like state for over a quarter of a century and then come to life again! It will be evident, therefore, that ear-cockle can be easily propagated from year to year, and if the farmer had sown these black-looking, grain-like bodies as a new variety of wheat, along with healthy grain, he would have reaped a similar crop.

RUST IN WHEAT, AND THE DETECTIVE.

This is a true detective story which dates back to the year 1890, and, strange to say, the whole interest of it centres round the discovery of a remedy for rust in wheat. Rust in wheat, as you know, is a disease which in some seasons plays fearful havoc with the wheat crop, and it was estimated that in 1898 the loss to Australia from its ravages amounted to between £2,000,000 and £3,000,000 sterling. The disease is known wherever wheat is cultivated, and, since no means of preventing it were known, the different States of Australia combined, and in 1890 guaranteed a reward of £10,000 to anyone who discovered a specific for it. I was appointed by the Government of Victoria to test the various remedies submitted, and I need hardly say that the tempting offer brought forth quite a shoal of remedies, and some of them of the most ridiculous character. There was one, however, which seemed to promise good results, and in a letter to the then Minister of Agriculture, under date 15th February, 1890, the late Mr. Smith Ellis stated :—" I have patiently and carefully experimented, year after year, until I have mastered the whole matter, and could *at once* put printed instructions in the wheat-growers' hands that would conclusively prove to them, being practical men, that I have given them all the information they require to enable them to grow *rusted or clean wheat at will*. If the Australian conference can do this, and put instructions into the wheat-growers' hands that will protect the *next crops*, then I retire ; if not, I ask ten thousand pounds (£10,000) to be paid to me by the colonies jointly, in such proportions as they may decide upon. And please to note—I accept of no money whatever until the utility of my instructions has been thoroughly tested, say at the end of two years, by which time rust in wheat can be as effectually eradicated as scab in sheep has been." The result was that the offer was accepted and a bond of agreement duly drawn out and signed, and a pamphlet published, entitled " Smith Ellis's Preventive for Rust in Wheat."

Meanwhile, Mr. Smith Ellis had planted a small plot of wheat in front of his house in South Yarra, which he triumphantly asserted to be free from rust : but on my visiting the plot, which was still in the green stage, in October, 1890, and pointing out the rust pustules towards the base of the plants, which he had overlooked, he seemed much interested in the appearance of rust, which he was evidently unacquainted with as seen through a magnifying glass. The essence of his method consisted in (1) reaping the seed for wheat when it was perfectly ripe, because immature wheat had a tendency to disease : (2) keeping it perfectly dry, because, when moist, mould might develop and a state of fermentation ensue : (3) sowing it in a wet seed-bed.

His own words are :—" Sow early, and, if possible, after the rains have moistened the soil ; the ' rust smoke ' perishes in water. And wheat-growers should be specially warned that their crops are liable to be destroyed by rust if even the smallest portion of their seed is mildewed, as that state is, to a certainty, the predisposing cause of the attack of the parasite. The necessary precautions which I have recommended cost absolutely nothing ; and if farmers will only adopt these precautions they need never be alarmed about the rust plague destroying their wheat crops."

Accordingly, a committee of investigation was appointed by the Minister, consisting of Messrs. Pearson, Knight, and myself, for Victoria. As experience had taught me to act warily with discoverers when £10,000 was at stake, I arranged with Mr. Ellis to meet the committee at a farm in the Goulburn Valley to choose his own seed-wheat, and see that it was perfectly ripe when reaped, then it could be kept dry under his personal supervision, and finally sown under conditions selected by himself. He agreed to this, and appointed a day of meeting with the committee at the farm agreed upon, but afterwards he changed his mind, and met me at the railway station to start for the Goulburn Valley, when he bluntly informed me that he was not going. He had evidently made up his mind to carry out experiments on his own account, and had made arrangements with the Curator of the Botanical Gardens to have a small enclosed space there for the purpose. I understand that he sowed two plots there—one treated according to his method to ensure a clean crop, and the other sown in the usual way ; but, with that perversity which often occurs in agricultural experiments, the carefully tended and treated crop developed the rust, while the other was comparatively clean.

Shortly afterwards the startling announcement appeared in the daily press that the experimental plots had been ruthlessly destroyed by some vandal hand during the night, and accompanied by the suggestive remark that a gentleman with a magnifying glass had been seen inspecting the plots the day before. Judge of my surprise when Detective Cawsey, as he then was, called at the College of Pharmacy inquiring for me, as the students were about to assemble for the lecture, and one of them informed me of the fact that the detectives were after me ! On meeting the detective in my private room, he delicately hinted to me that I was accused of destroying the experimental plots : but after explaining to him the circumstances connected with the plots and the monetary interests involved, and stating that, no matter who carried out the experiments, I would be curious to see the results, he went away apparently satisfied. This was my first and last and only meeting with a detective.

But there is a sad and pathetic sequel to this story. Mr. Ellis evidently believed in himself, and he continued his experiments in the little patch of ground at the Botanical Gardens, but they were suddenly terminated. As reported at the time, on 29th July, 1891, at half past 9 o'clock in the morning, he went to inspect the patch and to hoe out the weeds, and had not been engaged at his task many minutes when he was noticed by some of the gardeners to fall upon the ground as if in a fit. They hastened to his assistance, but within a few minutes, without word or motion, he was dead.

I would just add that the problem of rust in wheat is not yet solved. True, Mr. Biffen, of Cambridge, has bred a wheat immune to yellow rust (*Puccinia glumarum*), which does not exist in Victoria, but still susceptible to the black rust (*Puccinia graminis*). At present I am testing different species or subspecies of *Triticum* as regards their rust-resisting qualities, and by crossing one species or variety immune to black rust with another susceptible to it, but possessing the desirable qualities required by the farmer, it is believed that in this way the rust may be conquered.

THE GENUINE AND THE SPURIOUS LOCUST FUNGUS.

This is an instance of a scientific blunder which led to various complications, and some of these are sufficiently amusing to be worthy of record here.

The locust plague, in some seasons, is very destructive in Australia, as well as in other parts of the world, and various attempts have been made to cope with it. It was found in South Africa that a parasitic fungus attacked and destroyed them wholesale, and if this fungus could be used for infecting them artificially it would be a valuable discovery. Accordingly, cultures were made at the Cape and sent out in tubes as the "South African Locust Fungus." Several of these tubes reached me in October, 1899, from the Director of the Bacteriological Institute at the Cape, accompanied by the following note:—"I may mention that many thousands of tubes have been used in this colony with unflinching success in wet weather, if properly applied. In dry weather the fungus is not so certain in its results; but even then it has been extremely satisfactory in the hands of the locust experts sent out by the Government, who are practised in its use. The fungus has been despatched to Cyprus, Algeria, Palestine, South America, and many other parts of the world." Accompanied by such a strong recommendation, it is no wonder that the cultures were used by Mr. French, the Government Entomologist, and others.

My interest in the fungus consisted in determining its systematic position, in order to know its nature and whether it was likely to affect other forms of life. It was determined to

be a *Mucor*, one of the common bread-moulds, and this was afterwards supported by Masee, of Kew. The interest of this determination lies in the fact that the true locust fungus is not a *Mucor* at all, and the wrong one was sent out by mistake. How it came about was this: The parasitic fungus which killed the locusts was *Empusa grylli*, but *Mucor* was also present on the *dead* locusts, and so, by an unfortunate mistake, the locust fungus, which was sent out in tubes with gelatine, was a species of *Mucor*, or a mould which is not a parasite. The locust destroyer will only grow on the living tissues of the locust, and has never been cultivated on dead substances. It is closely related to the parasite on the common house-fly (*Empusa muscæ*). Everyone is familiar with the dead fly stuck to the window-pane and a white halo surrounding its body.

In view of this scientific, although unintentional blunder, it is interesting as well as amusing to read of the wonderful success of the imaginary parasite, reminding one of the effects produced by the bread pill or the coloured water of the physician. In the annual report of the Government Entomologist for 1902 it is stated that "the locust fungus introduced from the Cape has proved very successful against grasshoppers, especially in the cooler and more mountainous parts of our State, no less than 400 applications for the fungus having been made by graziers and others." In the report for 1903, the demand for the tubes is shown to be largely on the increase, as it is remarked that "the grasshopper fungus has been a greater success than we anticipated, the applications for supplies numbering 1,207, the number of tubes posted being nearly 5,000." Mr. French suggested that a small charge should be made for the material, and this seems to have damped the ardour of those using it, for in the report for 1904 it is stated that "the grasshopper fungus tests have been followed up, and my suggestion as to making a small charge for the material has made a large difference in the number of tubes applied for, the number of tubes sent out during the year being 842, and the amount received for same £36 6s."

It will naturally occur to you that if this "South African locust fungus" has maintained its reputation as a locust destroyer it will be extensively used in the country of its origin, where locusts have caused such enormous losses; but the report of the chief locust officer has recently been issued in the *Agricultural Journal of the Cape of Good Hope* for February, 1910, and there is no mention of the locust fungus. He points out that the most successful method of destruction is to spray the veldt with a dilute solution of sodium arsenite and treacle, or, if the grass is too short, to soak in this solution finely chopped green vegetation, bran, or even the young locusts themselves.

It is a comparatively simple matter to destroy the locusts at an earlier stage by spraying them immediately they hatch out. In a summary of experiments with the locust fungus by Inspector Cock, recorded in Mr. French's "Destructive Insects of Victoria," Part III., it is stated:—"I raised the fungus from the dead locusts in three days in moisture, thus proving the fungus was the cause of death." This is just a similar mistake to the one originally made, confounding the fungus found on the dead body of the insect with that producing the disease.

Where definite experiments were carried out the results were negative, and I need only refer to those of the United States, as given in the *Transvaal Agricultural Journal* for July, 1907:—"In the United States, where the whole matter of the South African locust fungus was investigated on thorough scientific principles, we find that no evidence was obtained to show that a single locust had been killed by the fungus, and that the experiments carried out with the fungus at the Colorado Experiment Station proved an utter failure; and examination of localities where success was reported showed conclusively that they were dying from another fungus, *Empusa grylli*, which had not been disseminated by the hand of man."

What complicates the situation is that the grasshoppers and locusts have their natural enemies, and that these have destroyed the insects when the saprophytic *Mucor* was supposed to have done so. Cases are not unknown, even in the domain of medicine, where the perfectly harmless spurious article was supposed or believed to produce wonderful results: but this is the only instance known to me of the attribute of "faith" being applied to the destruction of grasshoppers and locusts.

A NEW FORM OF VEGETABLE CATERPILLAR (?).

A distinguished entomologist in a neighbouring State sent me specimens of what he called a new form of *Cordyceps*. Accompanying the specimens there was the following description:—"The lepidopterous caterpillars (*Agrotis* or other Noctuid) are under an inch; the stalk whitish, less than a millimetre at base, and gradually attenuated to about .2 mm. or less, the dark stroma short and thread-like. No indication of branching, though *Cordyceps hawkesii* appears to be the only one comparable in form."

Now, the recipe given in Mrs. Glasse's cookery book for the preparation of jugged hare is very appropriate here—"First catch your hare"; and before attempting to name or describe a fungus, it is well to make sure that there is one. As a matter of fact, the specimen was the rat-tailed larva of the drone or bee-fly (*Eristalis tenax*), which is figured in Froggatt's "Australian Insects," and the larvæ are described as "dirty-white maggots, with slender rat-tails at the tip of the body, and they

live in all kinds of rotten or semi-liquid refuse." Instead of being a *Cordyceps*, it was simply a natural appendage, and this pardonable mistake is only another illustration of the necessity for careful examination before jumping at conclusions.

These are only a few of what might be called "the tit-bits of vegetable pathology": but perhaps I had better not trespass further on the time and patience of a staid body of field naturalists. If I have succeeded in giving you a share of the pleasure experienced by myself in putting together these few notes on the lights and shadows of plant-life, then my object has been attained.

RECORDS OF GRAMPIAN PLANTS.

To the Editor of the Victorian Naturalist.

SIR,—I heartily agree with the remarks of Prof. A. J. Ewart in *Vict. Nat.* for October, 1910, p. 106, anent complete accuracy in identification of botanical specimens; but I take exception to some covert criticism regarding certain records of mine published in *Vict. Nat.*, June, 1910, p. 33. In that article I claimed to have seen two orchids—*Thelymitra fuscolutea* and *Caladenia filamentosa*—in the Grampians. The former is nothing new, having been recorded for that locality as far back as 1891*: but the latter, which I will exhibit, I claim as the first record for the Grampians. These specimens have been verified by the National Herbarium.

I also recorded *Banksia integrifolia* from the highlands of Mt. William and Mt. Redman on personal observation; and when Prof. Ewart wrote me concerning it I pointed out that it was recorded previously by the late Baron von Mueller and Mr. G. Weindorfer. I took the first opportunity of sending specimens of this plant to the Herbarium, and I have received acknowledgment from Prof. Ewart (written, apparently, since his remarks were committed to manuscript) that my identification is correct!

On page 106, still referring to my Grampian notes, Prof. Ewart states:—"Three ferns are recorded as new to the district, but I have seen no specimens of them." I much deplore that some unforeseen circumstance has prevented the worthy professor remembering that, in June last, I sent him what specimens I had of the ferns in question, and, dated 7/7/10. I have his reply, containing these words:—" *Aspidium capense*, Willd. (verified).—Possibly correct, but not in fruit. *Polypodium*.—Probably *pustulatum*, Forst., but without fruit. *Hymenophyllum*.—Imperfect."

I hope this little explanation will open the way for further botanical work in this field. I may say that I am one of those

* See report of a visit of this Club, *Vict. Nat.*, vol. viii., p. 181.

tyros who believe thoroughly in the late Baron von Mueller's "Key" as a working text-book. I am not aware that it has been superseded.—I am, &c.,

A. G. CAMPBELL.

Pomonal, *via* Stawell, 24th October, 1910.

BIRDS AND PLANTATIONS.—In his "Bush Notes" in a recent *Australasian* (10th September), "F. R." describes, in an interesting way, the evening arrival of various kinds of birds at one of the plantations which are becoming a feature of our Western District plains. The plantation in question was only about an acre in extent, and was composed chiefly of sugar gums and acacias, with a few white gums. None of the trees were more than twenty feet in height, but were all well-grown and leafy. When he reached the spot a few minahs had already arrived. Then came the White-eyed Crow, followed by magpies up to the number of at least two hundred. A Harmonious Thrush put in an appearance, then a pair of Restless Flycatchers and a number of Yellow-rumped Tits; then came parrots by the score, Rosellas and the Blue-headed Grass-Parrakeet. The former bird seems to have become much more common during recent years. A pair of Black-and-White Fantails retired into the depths of the foliage, and their pretty and characteristic song—"sweet-pretty-little-creature"—would probably be heard at intervals through the night. Blue Wrens were followed by English goldfinches, which are becoming quite common on the Western plains, and, fortunately, cannot be accused of any misdeeds. The Grallina, or Mud-Lark, turned up in large numbers. This bird is an eminently useful one, clearing, as it does, the small pools of the fluke snail, &c. Honey-eaters, represented by the familiar "Greenies" and a pair of New Holland Honey-eaters, arrived from another plantation. On another visit a few weeks later scores of Flame-breasted and Scarlet-breasted Robins were noted. As he confined his attention to one corner of the plantation only (as moving about would have probably frightened the birds), it is quite possible other species were also present; but the foregoing list will be sufficient to show the value—at any rate, to the birds—of the plantations, which are gradually altering the character of the treeless plains of Western Victoria.

AUSTRALIAN HETEROCERA.—Under the heading of "Rhynchotal Notes," Mr. W. L. Distant describes, in the October *Annals and Magazine of Natural History*, about a dozen new species of Australian wood-bugs, belonging to the family Pentatomidæ, from various parts of Australia. One of them, *Austromalaya souëfi*, is named in honour of Mr. D. Le Souëf, who forwarded the specimen to the British Museum from Cooktown, Queensland.

The Victorian Naturalist.

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No. 324.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 14th November, 1910.

The president, Mr. F. Wisewould, occupied the chair, and about 60 members and friends were present.

CORRESPONDENCE.

The hon. secretary said that a letter had been received from the Kerang Progress Association asking for the support of the Club in having the Kow Swamp, and First, Second, and Third Lakes in the Kerang district proclaimed as sanctuaries for fish and native game. He said that the committee was in communication with the Advisory Committee on the *Game Act* and the National Parks Association, with the view of concerted action in the matter.

The hon. secretary called attention to a copy of a petition addressed to the Parliament of Victoria relating to the alleged eviction by the Government from the Buffalo Mountains of persons who had hitherto obtained a livelihood there by providing guidance and board, &c., for tourists, and said that the matter was still *sub judice* by the Lands Department, but the petition could be signed by any individual members who wished to do so.

REPORTS.

A report of the excursion to Graham Falls, Belgrave, on Saturday, 29th October, was given by the leader, Mr. F. Pitcher, who said that, notwithstanding the threatening weather, twelve members and friends attended. Though the day turned out very showery and unpleasant, no regrets were expressed at having ventured on the trip. The route taken was the same as that of the excursion in November, 1909, described in the *Naturalist* for December last. Unfortunately, the wet state of the country prevented much botanizing being accomplished, while insects and birds were almost totally unseen. The following plants not recorded for the previous visit were noticed in bloom:—*Australina pusilla*, *Daviesia latifolia*, *Goodenia ovata*, *Goodia lotifolia*, *Indigofera australis*, *Melaleuca ericifolia*, *Pittosporum bicolor*, *Pultenaea Gunnii*, *Senecio australis*, *Tecoma australis*, *Urtica incisa*, &c. The tea-tree recorded as doubtful on the previous occasion has since been identified as *Leptospermum lanigerum*. The locality is perhaps the most accessible to Melbourne, in which a good representation of our forest vegetation can be readily seen, and the many magnificent

panoramic views obtained between the Falls and Ferntree Gully added greatly to the enjoyment of the outing.

A report of the excursion to Nyora on Cup Day, 1st November, was given by the leader, Mr. P. R. H. St. John, who reported only a small attendance of members. The day was beautifully fine, and flowers of all kinds were abundant, no less than 145 species being recorded for the day. Birds also were plentiful, and he considered the locality worth visiting on a future occasion.

A report of the excursion to Frankston on Saturday, 12th November, was given by the leaders, Messrs. P. R. H. St. John and J. W. Audas, who reported a rather small attendance of members. It was found that flowering plants were, in many cases, past their best, though about ninety species were recorded for the day. Birds were very numerous, and a number of nesting burrows of the Spotted Pardalote were seen.

A report of the junior excursion to Studley Park on Saturday, 5th November, was given by the leader, Mr. F. G. A. Barnard, who said that, as the day turned out most unpleasant, there was some excuse for the very small attendance of juniors. The object of the excursion was the study of insects, for which a more unsuitable day could hardly have occurred. However, they had managed to find representatives of every order, and with some difficulty he had been able to give a little practical instruction in capturing and mounting insects.

ELECTION OF MEMBERS.

On a ballot being taken, Miss A. Douglas, Mona-place, South Yarra, and Mr. Oscar W. Rosenham, 482 Collins-street, Melbourne, were duly elected members of the Club.

PAPERS READ.

I. By Mr. G. A. Waterhouse, B.Sc., F.E.S., entitled "The Identity of the Butterfly *Miletus euclides*, Miskin."

The author stated that for some time he had doubted the fact of the lyænid butterfly, *Miletus euclides*, described by Miskin, having been captured in Gippsland, Victoria, seeing that it so closely resembled his species *M. meleagris* from North Queensland. A recent examination of some butterflies in the collection of Dr. T. P. Lucas and the surrounding circumstances seemed to prove his contention, and he considered that *M. meleagris* must be regarded as a synonym of *M. miletus*, and that Gippsland must give place to North Queensland as the locality of *M. miletus*.

Mr. F. G. A. Barnard, who read the paper in the absence of the author, said that the circumstances related in the paper should show young collectors the necessity for the proper labeling and storing of their specimens.

2. By Mr. J. W. Audas, entitled "Wanderings in East Gippsland."

The author described in an interesting way a recent trip to Buchan, devoting his remarks principally to the vegetation of the district, which, to a Melbourne collector, affords many novelties.

The paper was discussed by Messrs. A. D. Hardy, J. Gabriel, J. Shephard, and F. G. A. Barnard.

NATURAL HISTORY NOTES.

Mr. J. A. Kershaw, F.E.S., drew attention to the exhibit by Mr. J. Searle of the wings of the butterfly *Pyrameis kershawi* attached to the viscid leaves of a sundew, *Drosera menziesii*, as a remarkable example of the power possessed by the leaves of this genus of plants in capturing animal victims.

Mr. A. D. Hardy said that during a journey to the Mallee in October, he had, contrary to the oft repeated statement, seen many White-backed Magpies in the Sheoak country, between the Dividing Range and the Mallee, but in the Mallee itself the Black-backed species only was observed.

EXHIBITS.

By Mr. J. W. Audas.—The lichens *Teloschistes chrysophthalmus*, L., *Ramalina leiodea*, var. *fastigiata*, and *Usnea barbata*, var. *scabrida*, all on twigs of tree violet, *Hymenanthera Banksii*; also specimen of black marble from Buchan.

By Mr. F. G. A. Barnard.—A pot-grown specimen of Native Beech, *Fagus Cunninghami*, about thirty inches high.

By Mr. A. G. Campbell.—Specimens of orchid *Caladenia filamentosa*, R. Br., from Grampians, Victoria (October, 1909). This orchid is sometimes regarded as a form of *C. Patersoni*, and was referred to in October *Naturalist*, page 135.

By Mr. F. Cudmore.—Fossils, principally from West of England, including several fine plant impressions.

By Mr. C. J. Gabriel.—Sixteen species of cowries, collected by Mr. J. Gabriel at Cairns Reef, off Cooktown, North Queensland, viz.—*Cypræa annulus*, L., *C. arabica*, L., *C. carneola*, L., *C. caurica*, L., *C. cribraria*, L., *C. errones*, L., *C. lynx*, L., *C. moneta*, L., *C. talpa*, L., *C. tigris*, L., *C. vitellus*, L., *C. staphylæa*, L., *C. quadrimaculata*, Gray, *C. erosa*, Lam., *C. cylindrica*, Born., *Trivia oryza*, Lam.

By Mr. A. D. Hardy.—Two specimens of *Volvox globator* (L.), Ehrenb., showing (a) the young plant in vegetative condition, collected in spring; (b) the matured plant, collected in autumn, with stellate oospores, by which it may be distinguished from *V. aurens*, Ehrenb., possessing smooth oospores.

By Mr. J. Searle.—Sundew, with wings of butterfly attached, in illustration of note.

By Dr. C. S. Sutton.—Plants collected at Orbost, East Gippsland; growing plant of fern *Lomaria vulcanica*, from Tasmania.

After the usual conversazione the meeting terminated.

EXCURSION TO NYORA.

ONLY a small party visited Nyora on Tuesday, 1st November (Cup Day). Nyora, it may be mentioned, is on the south-eastern line, just 55 miles from town, and situated almost 400 feet above sea-level. Perhaps the early start (6.30 a.m.) militated against a large attendance of members. However, those who went were gratified with a beautiful day, and a wonderful array of flowering plants, the district being just at its best. The lovely shade of ultramarine blue afforded by *Dampiera stricta*, the white and various shades of delicate pink of the tea-tree, *Leptospermum mysinioides*, the creamy-white flowers of the Wedding-bush, *Ricinocarpus pinifolius*, and the various other shades of colour displayed by the many representatives of other natural orders combined in making a gorgeous sight. Specimens of a white-flowered variety of *Dampiera stricta* were obtained, a variety which in all my years of collecting I had not met with before. During the day no less than 145 species were noted in bloom, representing 41 natural orders. Naturally, the Leguminosæ claimed the largest number of species, fourteen; while of Orchideæ, twelve species were met with. From the following list of the more noteworthy plants some idea can be gained of the class of country met with, and the fine range of species occurring in the limited area traversed:—*Acacia decurrens*, *Aotus villosa*, *Brunonia australis*, *Bauera rubioides* (pink), *B. rubioides* (white var.), *Brachyloma ciliatum*, *Brachycome cardiocarpa*, *Clematis aristata*, *Caladenia Menziesii*, *Calceana major*, *Cyperus tenellus*, *Comesperma ericinum*, *C. volubile*, *Centrolepis strigosa*, var. *tenuior*, *Dillwynia ericifolia*, var. *normalis*, *Epacris lanuginosa*, *Goodia lotifolia*, *Gleichenia flabellata* (fine specimens on bank of creek), *Goodenia geniculata*, *G. elongata*, *Hydrocotyle geraniifolia*, *Hibbertia angustifolia* (this species grows flat on the ground, and is almost covered by its large primrose-coloured flowers, not found in the "heath" country near Melbourne), *Isotoma fluviatilis*, *Leptospermum scoparium*, *L. lanigerum*, *Melaleuca squarrosa*, *Olearia* (Aster) *stellulata*, var. *lirata*, *O. ramulosa*, *Pomaderris apetala*, *Patersonia longiscapa*, *P. glauca*, *Pultenæa scabra*, *P. stricta*, *Restio tetraphyllus*, *Senecio australis*, *Thelymitra aristata*, *Trifolium arvense* (Europe, Asia, and Africa), *Teucrium corymbosum*, *Tetratheca ciliata*, *Viola hederacea*, and *Xanthosia dissecta*.

Birds also were plentiful, and while many were seen and

identified, the notes of many more were heard in the bush. Some of those observed are included in the following list:—Blue Wren, Black Fantail Flycatcher, Bronze Cuckoo, Crimson Parrakeet, Coachwhip-bird, Crescent Honey-eater, Crested Shrike-Tit, Fan-tailed Cuckoo, Grallina, New Holland Honey-eater, Pallid Cuckoo, Rufous-breasted Thickhead, Sacred Kingfisher, Spine-billed Honey-eater, Spotted Pardalote, Tawny-crowned Honey-eater, Rose-breasted Robin, Yellow-breasted Shrike-Robin, Wood-Swallow, and White-eared Honey-eater.

The first Club visit to the district having revealed so much, I would like to suggest the locality for consideration when the next excursion list is being arranged.—P. R. H. ST. JOHN.

EXCURSION TO FRANKSTON.

THE country to the south of Frankston having been frequently visited by Club excursions, the outing listed for Saturday, 12th November, was set down as “Frankston to Skye”—Skye being a small village about six miles north-east of Frankston, but, owing to want of time, our ramble covered only a portion of that distance. We found that we were a little late for the district, the blooming period of many of the plants being over, still some ninety species were recorded for the afternoon, representing about forty natural orders. We came across one of the finest specimens of the so-called Native Cherry, *Exocarpus cupressiformis*, one could wish to see. The following list gives some of the more conspicuous or interesting plants noted during the afternoon:—*Acacia verticillata*, var. *ovoidea*, *Aotus villosa*, *Arthropodium paniculatum*, *Billardiera scandens*, *Brachyloma ciliatum*, *Brunonia australis*, *Comesperma calymega*, *Casuarina distyla*, *C. suberosa*, *Caleana major*, *Cyperus tenellus*, *Centrolepis strigosa*, var. *tenuior*, *Euphrasia collina* (syn. *E. Brownii* and *E. speciosa*), *Gahnia trifida*, *Gnaphalium candidissimum* (South Africa), *Gratiola Peruviana*, var. *pumila*, *Hakea pugioniformis*, *Hydrocotyle callicarpa*, *Isotoma fluviatilis*, *Leptospermum scoparium*, *L. brevigatum*, *L. myrsinoides*, *Pimelea octophylla*, *Patersonia glauca*, *P. longiscapa*, *Ricinocarpus pinifolius*, *Stypandra cœspitosa*, *Stackhousia viminea*, *Schizœa fistulosa*, *Stylidium perpusillum* (*Candollea perpusilla*), *Viminaria denudata*, and *Xanthorrhœa minor*.

Two fine specimens of *Eucalyptus robusta*, Smith, the swamp mahogany of New South Wales and Queensland, were seen in full bloom as street trees near the Frankston railway station.

Birds were very numerous, about thirty-two species being recorded for the afternoon.

In a bank on one part of the road were seen a number of the tunnels of the Spotted Pardalote, which, judging by the way the

birds flew about our heads, were evidently occupied by nests. The following list gives some of the more interesting birds observed :—Black-faced Cuckoo-Shrike, Black Fantail Flycatcher, Brush Bronze-wing Pigeon, Brown Tit, Blue Wren, Crimson Parrakeet, Fan-tailed Cuckoo, New Holland Honey-eater, Spine-billed Honey-eater, Rufous-breasted Thickhead, Spotted Pardalote, Orange-tipped Pardalote, White-browed Scrub-Wren, Red Wattle-bird, White-fronted Chat, White-browed Babbler, and Noisy Miner.

Insects were fairly plentiful, especially the little brown, cockchafer-like beetle, *Diphucephala colaspidioides*, the tea-trees *Melaleuca* and *Leptospermum* being covered with thousands of the beetles, giving them the appearance of having been scorched.—P. R. H. ST. JOHN and J. W. AUDAS.

SLUDGE ABATEMENT BOARD IN VICTORIA.—The recently issued Annual Report of the Secretary for Mines, Victoria, for 1909, makes public some interesting facts in that portion containing the report of the Sludge Abatement Board. The effects of the natural erosion of streams, and the disposition of silt from mining operations, are very graphically placed before the reader by a fine series of illustrations of typical localities. Dredges have now been so improved that the damage they do to the alluvial flats has been greatly minimized. Illustrations are given of crops of lucerne and maize growing on old tailings dumps which have been levelled and sown. That the whole of the increase in size of the watercourses is not due to mining operations is shown by illustrations of the Boggy Creek near Moyhu, where no dredging has taken place, which twenty years ago could be stepped across; now it is a gulch 30 to 60 feet wide and 20 feet deep. (May not some of this erosion be due to the removal of timber along the banks, and the destruction of the forests at the heads of the streams?) Pictures taken on the Golf Hill estate, Shelford, show a different story. Here the land has in places been covered almost to the tops of the fences with battery sand washed down from Ballarat, 40 miles away, on to the flats, and when dry blown about by the wind. The sand averages over many acres a depth of 15 to 18 inches, and naturally has quite destroyed the property from the grazier's point of view.

BOTANICAL WORKS.—The Department of Agriculture, Victoria, has issued a list of its publications, with prices. In order to reduce the stock of some of the works by the late Baron von Mueller, they have been reduced very considerably in price, and students have the opportunity of filling vacancies in their libraries at a nominal cost.

THE BIRDS OF VICTORIA.

A LECTURE BY J. A. LEACH, M.Sc.

(Delivered before the Field Naturalists' Club of Victoria, 12th September, 1910.)

No apology is needed for the choice of the birds of Victoria as a subject for a lecture, for no country in the world can approach Australia in the interest of its animals and plants. No less an authority than the great Huxley divided the world into two—Australia and the rest of the world—so far as the interest of the furred animals (mammals) was concerned.

We are even more fortunate in regard to birds, for we not only have our own peculiar interesting birds, such as the Emu, Mallee-Hen, Black Swan, Laughing Jackass, cockatoos, many parrots, Lyre-bird, Bower-birds, and many others, which will be referred to later, but we also have one or more representatives of every widely-spread family of birds but two, the only two widely-spread families totally absent from Australia being the vultures and woodpeckers. Our rare and peculiar forms far more than counterbalance the loss of these two. Thus, Australians should be proud of their birds, and do their best to preserve them for future generations.

Passing now to a consideration of the different groups, birds in general are divided into two sub-classes—(1) Palæognathæ and (2) Neognathæ. The first is the small group of flightless, running birds, made up of five living birds, all inhabiting southern lands. These are the Emu and Cassowary of Australia, the Ostrich of South Africa, the Rhea or South America Ostrich, and the Kiwi or Apteryx of New Zealand.* Taken together with other evidence, all pointing in the same direction, scientists have been led to imagine a great southern land mass connecting these southern lands, for the Emu did not fly here, nor did the Rhea fly to South America, but they must have reached their present home by land. These birds, not flying, have no big wing-muscles, and so do not need the keel or ridge of bone down the breast. Thus they belong to the sub-class with a raft-like breast bone. All other living birds belong to the sub-class the members of which have a keel on the breast bone for the attachment of the wing-muscles. The large number of Australian birds belonging to this second sub-class are now divided into 20 orders, which, with the Emu order, make a total of 21 orders of birds represented in Australia.

The Emu is our only representative of the first order, *Casuariiformes*.

The birds of the second order—*Galliformes*—are well known

* The Truanois of South America are also placed by Pycraft in the Palæognathæ.

as scratchers. They include the domestic fowl, which has been derived from the wild jungle fowl of India. Quail are also included here; so are pheasants. The absence of pheasants from Australia is more than compensated for by the presence of the mound-builders—those marvellous birds which retain the reptilian characteristic of not sitting on their eggs. Thus the young have never known their parents. The eggs are laid in a huge mound of sand and earth, which covers rotting vegetation. The heat of decomposition is quite sufficient to hatch the eggs. The young are born fully feathered, able to run at once, and able to fly the day they leave the mound. Contrast their stage of development with that of a pigeon born naked, blind, and helpless, and that of a chick born clothed with down and able to run about. There is an interesting connection between the size of an egg and the state of development of the young bird at birth. The pigeon lays a relatively small egg, so the young pigeons do not develop far in the egg, and require much maternal care. The hen's egg is larger, and the chick is more fully developed. The Mallee-Hen's egg is enormous, and so the young can develop much further before birth. This bird, unfortunately, is doomed to early destruction, as the fox has discovered the rich store of food in the eggs, and Mallee farmers have also discovered that they are delicate in flavour and contain much meat. Bird-lovers are trying to get the scrubby western end of Kangaroo Island, where foxes are unknown, as a sanctuary for them.

In the next order—Turniciformes—the button or bustard quails, which have no hind toe, are placed, though one bird, the interesting Australian Collared Plain-Wanderer, has that toe.

In order four—Columbiformes—come the coopers (doves and pigeons). Australia is well off for pigeons, and we have eight kinds in Victoria. Dr. Newton has declared that our common Bronze-wing Pigeons are amongst the most beautiful of the world's pigeons. Our large Wonga Wonga Pigeon is said to be one of the best eating, and it is proposed to introduce it into Europe to breed for table purposes. Its scientific name means "white flesh."

Next in order come the long-toed, mud-walking water-hens, crakes, and rails, belonging to the order Ralliformes. Their long toes enable them to walk over soft mud without sinking. Water-hens are known to all. Indeed, when I finish I expect to have created in your mind an idea that bird study is very simple—that you know at least one of each of the groups of birds.

One further advantage of bird study is that so few birds are found in any district. Thus, only 395 have ever been recorded from Victoria, whereas there are over 2,000 kinds of native

flowering plants, not to mention non-flowering plants. Again, while it is impossible to talk of native plants popularly, because they have no common names, that does not apply to birds, for bird-lovers have given a simple name to each bird, so that even children can talk definitely and exactly about the different kinds. This is a great advantage. Again, as birds are living, moving, loving, and beautiful animals, they have always been favourite objects of study, and so we know more about them than about any other division of the animal kingdom. Thus you will, I hope, feel that you know far more about the subject than you at first thought.

In the sixth order—Podicipediformes—come the divers or grebes, known to all dwellers by streams or lakes. They are expert divers, and are active in the water, but are “absurd” on land. Their legs are set so far back that they can hardly walk. Their wings are so small that they can barely fly, and yet they have spread almost the world over. The Great Crested or Tippet Grebe of Victoria is identical with the Great Crested Grebe of England. So quick are these birds in the water that the story used to be told that they waited for the flash of the cap, and then dived before the bullet could reach them. The two small grebes are better known as “dabchicks.”

In the next order, Sphenisciformes, come those remarkable birds, penguins. As so much has been said about penguins by Lieutenant Shackleton's party, they have caught the popular fancy, and people are much interested in them. Many Victorians do not know that three of these birds are found on the Victorian coast. It was one of the sights of the last Summer School at Portsea to sit on one of the balconies and watch the penguins chasing their prey in the clear waters in front. Their wings are paddles, being flattened and devoid of quills. The wings are not folded, but are carried hanging awkwardly at the side. When Peary presented the North Pole to the American President, an illustrated paper came out with an interesting cartoon, which showed the American eagle sitting on the North Pole and addressing an audience of penguins. One thing is unfortunate about this—penguins are unknown in the Northern Hemisphere. Indeed, they support the geographer in his contention that, while the Pacific is a very ancient ocean, the Atlantic Ocean has been formed much more recently, for penguins are found up the Pacific even to the Equator, but have not spread into the Atlantic Ocean beyond South Africa.

In order eight—Procellariiformes—ocean birds are placed. These birds are true ocean wanderers, and do not come near land except to breed. There are three main groups of these—storm-petrels (“Mother Carey chickens”), petrels (including the Mutton-bird), and the albatrosses. All have read about the

storm-petrels, which appear during the wildest storms, and drag their feet over the crest of the waves as if, like St. Peter, they were walking on the sea. Hence the name petrel. The beautiful, graceful White-faced Storm-Petrel nests on Mud Island. As, being ocean birds, they are unlikely to have originally come into a land-locked harbour to breed, their presence there probably points to past changes in the history of Port Phillip—changes which receive the support of geographers, who are convinced that Port Phillip once had a wide opening to the sea, but which has been almost closed by the sand-drift from the west.

Mutton-birds take one's thought back to Bass and Flinders making their adventurous voyage of weeks along the Victorian coast in the *Tom Thumb*. They were able to replenish their stores with young Mutton-birds, and so extend their voyage, and finally to prove that Tasmania was not part of the mainland. Again, one's thoughts turn to the remarkable settlement on Cape Barren Island, a small colony of people depending entirely on the Mutton-bird for their annual harvest, just as the Mallee farmer depends on wheat. These people work only for about seven weeks in the year, when the young Mutton-birds are ready to take. They claim to take one and a half millions a year, sell one million, and keep half a million for their own requirements. They eat no other meat but Mutton-bird. These birds breed in enormous numbers on Cape Woolamai, Phillip Island. Time, however, will not permit a more detailed treatment, and we must pass on to the mighty albatrosses, which have fascinated most ocean voyagers in Australia's seas. For an hour at a time they have been known to wheel ceaselessly round and round a travelling vessel, and yet no flap of the wing could be detected. With a wing span of 10 ft. 6 in., they simply trim the wing and sail off, but one cannot say whence the great energy needed to propel the big bird with such speed is derived.

The Shy Albatross nests on the precipitous Albatross Rock, a rocky islet in a troubled sea north-west of Tasmania. The landing is most dangerous—indeed, getting such bird pictures is not devoid of inconvenience, much expense, and often great danger.

In group nine—Lariformes—we have the common shore birds, of which there are three chief kinds—the beautiful sea-swallows (terns), the sea-gulls, and the robber gulls, usually called skuas. The sea-gulls do not breed in Port Phillip, but retire to a rocky island where they have a chance of breeding without being interfered with. It is one of the sights of Currie Harbour (the chief settlement of King Island) to see a colony of these Silver Gulls breeding on a big rock within a few yards

of the pier. The local residents are proud of them, and do not interfere with them. Terns retire to lonely islands, too, to breed. The famous Sooty Tern is found in all warm seas. It is the "egg bird" of sailors. Small vessels go out from Cuba and return with a cargo of eggs, which have to be sold off quickly; so they are sold by the gallon, as there is no time to count them out. The skuas which follow the Bay steamers to Queenscliff each day in summer are identical with the skuas that are to be found on the English coast.

In order ten—Charadriiformes—come the wading birds, found about lagoons, shores, &c. They are of considerable interest, as they are wanderers. Nine of the Victorian birds are also found in England, and no less than seventeen of the thirty-five Victorian members of this group are really Siberian or Northern birds. When a bird migrates, it is the rule that it breeds in the colder of the two countries it lives in; so that these seventeen birds breed in Siberia, Japan, and Northern Asia, and then visit Victoria each season when it is too cold there. Think of the journey twice a year! Six of them even visit New Zealand. How do they find their way there, across a gap of over 1,000 miles, without any land whatever? Inherited memory is strong, but how did the first batches find their way? Their annual journey supports the geographer in his idea that Australia at no very distant date extended very much further to the east. Indeed, these birds almost certainly follow the old eastern coast of the Australian continent.

Snipe, some plovers, dottrels, curlews (sea), whimbrels, godwits, &c., thus go north each year to partake of the abundant banquet of fruits, &c., preserved in the great ice chamber of the north. Numberless flocks of birds follow up the melting ice, and so nest unmolested on the great tundras and plains of Siberia. They wear their bright wedding dress in the far north and are known here only in the quiet mottled browns and greys. Soon now these birds will depart. They travel mostly at night, to avoid hawks, &c., and so are seldom seen, though they may be heard calling as they pass high overhead.

Our inland curlew has a call very similar to that of the sea (true) curlew, but it has a short, straight bill instead of a long, arched bill. The proper name of the land curlew is the Southern Stone-Curlew. It is the only Victorian bird that seems to have the power of varying the colour of its eggs. If it lays in grass the eggs are greenish; if amongst ironstone, the eggs are reddish-brown; if on sand, the eggs are tawny, and so on. Other ground-laying birds seem to pick out the soil that matches the colour of their eggs, and lay there only. While the Snipe breeds in Japan, the Painted Snipe breeds in Victoria.

Our noble Bustard, or "Wild Turkey," comes in this group.

It is a valuable insect destroyer, and it is short-sighted policy to kill a bird for the table which has a much greater value as an insect destroyer.

In order eleven—Gruiformes, or Cranes—we have, fortunately, one representative, the Native Companion, the only true crane found in Australia. They are interesting birds, with their “quadrille parties,” “corroborees,” dances, &c. They live chiefly on vermin—insects, lizards, &c. The great Gould says:—“Its presence adds greatly to the interest of the scenery.” Would that more Victorians thought so!

Order twelve, Ardeiformes, contains the ibises, spoonbills, storks, egrets, herons, and bitterns. We have the equivalent of the valuable Sacred Ibis of the Egyptians—a bird they regarded as the saviour of their country. We also have the even more valuable plain-frequenting Straw-necked Ibis, which has an insatiable appetite for grasshoppers and destructive insects. This bird is worth much to Australia, and yet short-sighted farmers often shoot them. A third ibis is identical with the little Glossy Ibis of Europe.

Spoonbills are world-wide, and we have two—the Royal and the Yellow-billed. The Australian stork is not found so far south as Victoria.

Now come those beautiful birds the Egrets. Man’s cupidity and selfishness, and woman’s desire for ornament, seem to have doomed the birds to certain destruction, and, indeed, total extermination, for the plume trade, which is responsible for some of the “most abominable cruelty practised in the animal world,” is a war of extermination. These birds are extremely shy, and are approachable only in the breeding season, when they, in obedience to parental instincts and feelings, become brave in the defence of their young. The inhuman plume-hunters then visit the rookeries in the great Riverina swamps, and shoot the parents in cold blood, leaving the helpless, almost perfectly feathered, young to die miserably in the nest, so high overhead. And all for what? I cannot see that any lady needs help from these plumes to enable her to look more attractive, for it is just as much a ridiculous and wasteful excess as to “paint the lily” or to “gild refined gold.” Those engaged in the trade resort to the mean trick of calling the plumes “osprey plumes.” Now, the Osprey is a fish-hawk, and so possibly of little use to the land dweller, but these plumes grow on the back and neck of a valuable insect destroyer. The extent of this trade is appalling. For one plume sale held in London on 4th August, 1909, the breeding plumes of 24,000 birds were offered for sale. Think of it! The slow starvation of 40,000 nestlings, the death of 64,000 birds, to provide the plumes for one day’s sale. No, ladies! Wear ostrich plumes and

pheasants' feathers if you will, for these do not involve the death of a bird, but rather the reverse, for the more you wear of these the more birds there will be ; but spare the Egret.

The "Blue Crane" of the country dwellers is the "White-fronted Heron" of the bird-lover. "Fronted" in a bird name refers only to the forehead. These are valuable birds to the grazier, farmer, and irrigationist, for, in addition to insects and snails, they eat yabbies, which bore into the banks and bed of irrigation channels, and so cause much loss of water by soakage.

Bitterns are seldom seen ; hence their loud, dismal, booming note probably assisted in the formation of the "bunyip" legends of the aborigines.

In group thirteen—Anseriformes—come the large swimmers—swans, geese, and ducks. Our "Black" Swan was an impossibility to people accustomed only to white swans, and so assisted greatly in establishing Australia's reputation as a land of paradoxes and "upside-downs," so that Australia became known as the country where the cherries grew with the stone on the outside, where the trees shed the bark and not the leaves, where the cuckoo called at night (Boobook Owl), where there was a wren as big as a peacock (Lyre-bird), where foxes flew (large bats), &c., &c. Fortunately, our graceful swan is now protected, and is not decreasing as it did in Western Australia, where the Swan River was devoid of swans. However, on the suggestion of Mr. A. J. Campbell, president of the Australasian Ornithologists' Union, swans were re-introduced from elsewhere, and so Westralians again enjoy the sight of these glorious birds on their river. We have representatives of the chief kinds of ducks found in Europe, in addition to some peculiar forms found only in Australia, the most remarkable of these being the Musk-Duck.

In order fourteen—Pelicaniformes (fishers)—we are again fortunate in having at least one of each family. Cormorants or shags are well known. Are they friends or enemies of the fisherman ? According to Mr. A. H. E. Mattingley, they are friends, for they save more young fish and eggs by eating yabbies, &c., than they destroy later. So, anglers, hesitate ! Collect evidence, and balance good with harm. Fish were probably once much more abundant, but so were cormorants also. We have five kinds of cormorants, one of which—the big black one—is also found in England, and, indeed, almost the world over. The long-necked Snake-bird, or Darter, seems to have the "head and neck of a snake on the body of a bird." It is practically identical with the Water-Turkey of United States.

The Gannet may be often seen in Port Phillip diving from a

considerable height into the water. These birds breed on Cat Island, on the east of Flinders Island. Four thousand nests are to be seen there, each crowned by one of these large, picturesque birds. As you walk amongst them the sitting birds do not trouble to get off, but keep you awake, as each peck of the stiletto-like bill draws blood.

The famous Frigate-bird was twice taken in Port Phillip Bay. It is the best of flyers, as it can "breakfast on the Senegal (Africa) and dine on the Amazon."

The Pelican is the last of this group, and some writers have attempted to create a little mystery as to the place where the Pelican builds. We found it nesting on Penguin Island. The young have short bills, whereas the adults have a very long bill. This is interesting, as it reminds us that each animal in its development climbs its own ancestral tree, and that the long-billed Pelican is descended from a bird that had a short bill.

Order fifteen—Accipitriformes—includes the diurnal birds of prey—eagles, hawks, &c. Victoria has many of these valuable birds. Indeed, it is fully equal to Europe in the interest of this group. Thus, our eagle is the biggest eagle in the world, though, in association with our habit of belittling everything Victorian, it has been named the Eaglehawk. The Golden Eagle is 32 inches long from the tip of its bill to the tip of the tail, while our eagle is 38 inches. It is, further, bolder and braver than the Golden Eagle, as its scientific name, "*audax*" (bold), implies, and, as Gould says, is of a "more elegant and pleasing contour."

The falcon that we read about as being trained to hunt is identical with our falcon, while our Little Falcon is, for its size, the boldest and swiftest of all birds of prey, for it has been observed to decapitate a flying duck with a blow of the edge of its wing.

In owls—which form a separate order, Strigiformes—we are also well to the fore. Our large, Powerful (eagle) Owl is a formidable enemy if wounded, while the Boobook (cuckoo) Owl makes the call "mopoke" known to those who wander abroad on calm moonlight evenings.

Birds of prey, hawks and owls, always catch their prey in their well-developed talons, and not in the beak. When an artist represents an eagle carrying a lamb in its beak he is clearly drawing on his imagination.

In group seventeen—Psittaciformes—we come to the "cream of the Australian avifauna"—cockatoos and parrots.

Australians are indeed fortunate in the abundance of these beautiful birds. They are to be seen on every roadside, outside many a cottage door, and even on jam tins, and yet we do not appreciate them. I wondered, when noting the names of

parrots, to find that European ornithologists had called one "*splendidus*," another "*splendida*," two more "*elegans*," another "*pulchella*" (beautiful), another "*eximius*" (excellent), and still another was named by Gould "*pulcherrimus*" (most beautiful). Why these extravagant names? When one considers that there is no parrot in Europe, that a parrot is not mentioned in the Bible, that no parrot was known to the Egyptians, that parrots are unknown in Asia except India and the south-east, that but two were known in North America, and that one is extinct except in Florida, and that parrots are rare in Africa, then one can see the great good fortune of Australia in having so many of these beautiful pets of the animal world, for they are universal favourites, and almost every steamer that leaves our shores takes away numbers of these lovely birds. Victoria has no less than 33 parrots and cockatoos; so appreciate your privileges and preserve these lovely birds for your children's children to enjoy.

Cockatoos are found only in the Australian region, except one kind that has spread out to the Philippine Islands.

Outside Victoria the Rosella is esteemed one of the most beautiful of birds. These birds have been termed the "monkeys of the bird world."

In order eighteen—Coraciiformes—we are fortunate, for we have representatives of six families.

The Frogmouth—wrongly called the "Mopoke," though some claim that it does make a call similar to that made by the Boobook Owl—is of great value as an insect destroyer. It stiffens itself, closes its eyes, and so mimics a broken stump that it is almost impossible to pick it out, even when a man is looking at it. The Dollar-bird is our one representative of an old-world family. It has the usual rolling flight, and shows a white dollar on its expanded wing. Its beauty causes it to be a favourite for ladies' hats. Kingfishers are well known, and Australia has more than its share of these lovely birds. In addition, its Giant Kingfisher (Laughing Jackass) is one of the most famous of birds. Its jolly laugh adds something to life on a dismal grey day. The glorious Bee-eater is our one representative of a widely-spread family. A writer has well said there is "none so graceful and few so beautiful." It is a glory, and yet one lady appeared at a Melbourne Cup with twelve of these birds in her hat! She thus effectually drew attention away from herself.

Swifts are also famous birds. The other evening I saw some rushing overhead. They seem to hurl themselves through the air, so we can well believe, with Gould, that "they may be hawking for insects over Victoria one hour and over Tasmania the next." They visit Japan to breed. The "edible swallow's

nest " is made of saliva and seaweed by a swift, and is occasionally found in Queensland.

The cuckoos form order nineteen—Coccyges. Few birds have excited more interest than these. In England they have but one cuckoo, whose call has been aptly described as the " most imitable of bird calls." It is there the herald of spring, so it receives a joyous welcome. Victorians, blessed with eight cuckoos, still know much less about them. For one reason, none calls " cuckoo," and, further, in our winterless clime there is not the same glad welcome for spring as is felt in colder climates.

Our cuckoos are valuable insect and caterpillar destroyers, and so deserve well of us, though all are parasites, and leave their eggs and young to the tender mercies of foster-parents.

Taking order twenty—Menuriformes—to itself is the wonderful Lyre-bird, whose tail is recognized as the most beautiful tail ornament worn by any bird. These birds are restricted to the dense scrubs from Melbourne to Wide Bay, in Southern Queensland. They are apparently doomed. The fox has discovered their large nests, built usually on the ground. We hope to see the Lyre-bird put in the National Park at Wilson's Promontory, where the fox is not common. It is one of the best mocking birds in the world, and is fond of showing itself off to the admiring mates as it dances on its dancing mound.

In the last order—Passeriformes—the twenty-first, come the perching birds. Over 150 of our Victorian birds belong to this order. Many of these are the exact equivalent of birds found in Europe; others are peculiar to Australia. Thus, our swallows and martins, Mountain-Thrush, Reed-Warbler, Butcher-bird, Tree-runner, Tree-creeper, Ground-Lark (Pipit), Oriole, Crow, and Raven are very closely allied to European forms, while others, like the wood-swallows, Mistletoe-bird, and Drongo are met with out to India. The most interesting, however, are confined to Australia. Thus, our glorious little Blue Wrens are unrivalled. European ornithologists have called them " Superb Warblers," and well they deserve the name. Our robin redbreasts do not belong to the same family as the English redbreast, but they are even more beautiful. Our Magpie is unrivalled by any song-bird in Europe, as Alfred Russel Wallace testifies.

Only two can be mentioned among the peculiar Australian birds of this order. These are honey-eaters and bower-birds. Just as our forest trees, such as eucalypts, honeysuckles, &c., have brightly-coloured, honey-laden flowers and non-edible fruits, so our birds show an absence of fruit-eaters, and an abundance of honey-eating birds. Two groups of these birds have a brush tongue to assist them in taking honey from these

flowers. They are the honey-eating lorikeets (parrots) and the well-known and large family of honey-eaters. No less than 88 honey-eaters are found in Australia, 33 of which have been recorded in Victoria. They include some very common birds, such as the Wattle-bird, the Noisy Minah, and the common city dweller, the "Greenie." Some are glorious creatures, and are distinct ornaments to gardens, where they flash from flower to flower, taking the honey and the insects that feed on honey. They are the characteristic Australian family, and are not found outside the Australian region, except one that has crossed Wallace's line to Bali. Others have spread out to the Sandwich Islands, which, however, are included in the Australian zoo-geographical region.

The part of Gould's great work which he considered of most value was that referring to the description of the play-house of the bower-bird, for these birds, in addition to building a nest, build a playhouse, which they decorate with pretty, bright things, especially anything coloured blue. Just before Christmas, at Leongatha, I had the gratification of seeing a perfect bower within one chain of a busy metalled road and one chain of the corner of a school-ground. The children grew blue corn-flowers, which the birds took to the bower as soon as they opened. A blue hair ribbon also served as an ornament. These structures are "perfectly anomalous in the architecture of birds." Gould further says:—"Their brightly decorated halls of assembly must be regarded as the most wonderful instances of bird architecture yet discovered." Victorians, protect, then, your two bower-birds—the beautiful Satin Bower-bird of the south, and the Spotted Bower-bird of the north.

Australians, you live in a wonderful land, and not the least important part of those wonders is made up of the birds, that have been so thoughtlessly slaughtered in the past. Your duty demands the preservation of what still remains for future generations and mankind in general. See to it that the call of duty, which has received so magnificent a response in other matters, is cheerfully obeyed here.

NOTES ON THE COLEOPTERA OF NORTH-WESTERN VICTORIA.

PART II.—WATER-BEETLES.

By J. C. GOUDIE.

(Read before the Field Naturalists' Club of Victoria, 10th Oct., 1910.)

IN continuation of my paper descriptive of the Coleoptera of North-Western Victoria, published in the *Victorian Naturalist* for August, 1909 (vol. xxvi., p. 39), I purpose to-night to deal with the water-beetles of the district.

In Masters' "Catalogue of the Described Coleoptera of Australia" there are 58 genera, containing 261 species, of water-beetles enumerated. Mr. A. M. Lea, in the *Proc. A.A.A.S.*, 1902, records 27 species for Tasmania, 7 of which are indicated as being peculiar to the island.

In the present paper 17 named species are recorded for the Birchip-Sea Lake area, or, including 3 specifically unidentified—viz., one each of *Copelatus*, *Berosus*, and *Paracymus*—20 species. It will thus be seen that, while comparing favourably with Tasmania, in relation to the rest of the continent the number of species occurring in the Mallee districts is but few. On the other hand, some species are individually extremely plentiful, the writer having at times seen nearly dried-up water-holes literally "moving" with water-beetles of perhaps two or three species. The extension of the channels for supplying water to the Mallee, which connect with the Wimmera River in the south and with the Murray in the north, has been the means of introducing a few species which previously were not known to occur here.

The existing records of the distribution in Australia of this section of the Coleoptera leave much to be desired in the way of precise information, some of the earlier describers appearing to consider "Australia" a sufficiently definite locality when working up their material. Nowadays a specimen thus labelled might almost as well have no label. There is plenty of opportunity for collectors to do good work in this direction by drawing up lists of the species occurring in their respective districts, carefully recording the date of capture, thus paving the way to a correct estimate of the limits of distribution and breeding habits, &c., of any particular species.

Kirby has well remarked that "the collector's province may be exhausted in a few years, the observer's never;" and this applies with special aptitude to Australia, where climatic and other conditions are so varied and animal and vegetable life so abundant.

The water-beetles fall naturally into three groups or families—viz., Dytiscidæ, Gyrinidæ, and Hydrophilidæ—each defined by certain peculiarities of form or structure, and for information concerning which the reader may be referred to that splendid work, "Australian Insects," by W. W. Froggatt, Government Entomologist of New South Wales—a book, by the way, which cannot fail to delight anyone interested in entomology.

DYTISCIDÆ.

964. *Haliphus gibbus*, Clark (Nov.)

A strongly convex, oval species, about $\frac{1}{2}$ of an inch in length, of a pale yellow colour, each elytron being marked with eight lines or rows of very distinct punctures.

976. *Bidessus bistrigatus*, Clark (Jan.-Dec.)

An extremely abundant species, measuring $\frac{1}{10}$ of an inch in length. It is of a yellowish tint, with the hinder part of the head black, and the elytra blotched with dark brown.

1024. *Macroporus howittii*, Clark (Oct.-Feb., April).

Larger than the preceding, being nearly $\frac{1}{4}$ of an inch long. It is brown, the elytra having a black sutural stripe, a transverse sub-apical band or fascia, narrowly connected with which is a black blotch, placed about the middle of each elytron. I have a specimen, supposed to be a variety of *howittii*, having the black dorsal stripe, and two broad black longitudinal stripes, joined at both ends, on each elytron.

1057. *Lancestes lanceolatus*, Clark (Nov.)

An elongate oval species $\frac{1}{2}$ an inch in length. It is brown or yellowish; the posterior half of head black; posterior margin of prothorax edged with black. The outer margins of elytra are yellow, with the discal parts thickly marked with longitudinal black lines.

1058. *Rhantus pulverosus*, Steph. (Dec.-April).

This is a longer and broader insect than the last-mentioned. The under surface, except legs, is black; head brown, marked with black round the eyes; prothorax brown, with a black transverse mark in centre. The elytra appear of a uniform olive-brown tint, with pallid margins, but under a lens are seen to be finely freckled or spotted with black, and each having three rows of faintly impressed punctures.

7591. *Cybister tripunctatus*, Oliv. (Sept.-Dec.)

Described 115 years ago by Olivier, this is a well-known and widely-distributed species. It is over an inch in length, broad and depressed in form. In specimens freshly taken from the water the under parts are yellowish or fulvous, and the upper surface is dark olive-green, with a broad yellow margin running right round. On each elytron are three longitudinal rows of punctures—the one nearest the suture strongly, the two outermost rather feebly, impressed. The hind legs are developed into a pair of powerful fringed "oars," and these, with the smooth, oval shape of the body, enable it to glide with great ease through the water. It is carnivorous in its habits.

1108. *Eretes australis*, Er. (Nov.-Dec.)

A very common species, variable in size and colour, some specimens measuring $\frac{5}{8}$ of an inch. It is broad and flat, with the under surface and legs pallid. The head and prothorax are yellow, the hind margins of both marked with black, and there is also a black mark between the eyes. The elytra are darker, with a pale margin, and very densely and uniformly pitted with

dark punctures. There is also a distinct black spot on the outer margin of wing-case just behind the middle, and three rows of punctures, as in *Cybister tripunctatus*, these being very distinct in the lighter coloured specimens.

GYRINIDÆ.

1119. *Macrogyrus oblongus*, Boisd. (Nov.–April).

This is a curious and interesting insect. A specimen before me is over $\frac{3}{4}$ of an inch long, of a dark brownish tint, with a beautiful metallic gloss or sheen. The fore-legs are much longer than the others, resembling a pair of oars protruding from the sides of a boat. The eyes are divided horizontally, thus giving the insect two pairs of those useful organs. It goes about in "shoals," swimming on the surface of the water in an eccentric zig-zag course, and when alarmed or chasing one another its motions are so rapid that the eye can scarcely follow them. It can dive and swim under water with equal celerity, but does not remain long under the surface. It is quick on the wing and elegant in shape, and from these circumstances might be compared with the Buprestidæ amongst land-beetles.

HYDROPHYLLIDÆ.

1137. *Hydrophilus albipes*, Cast. (Oct.–Dec.)

There are five species of this genus recorded in Masters' "Catalogue," but so far only two have been met with in this district. *H. albipes* is about an inch in length, elongate oval, convex, shining black, with striated elytra. The palpi are much longer than the antennæ, and these, with the legs and feet, are paler in colour than the other parts.

1139. *H. latipalpus*, Cast. (Nov.–Dec.)

The giant of the group, typical examples measuring $1\frac{5}{8}$ inches in length. It is similar in form and colour to *H. albipes*, except that the legs are shining black. The penultimate joint of the palpi is strongly dilated or flattened, hence its specific name. It is an indifferent swimmer. Both the species of *Hydrophilus* are common in stagnant water, as well as in the waters of the Murray. They are said to subsist on food of a vegetable nature—at least, in the adult or perfect stage of their existence.

1141. *Sternolophus nitidulus*, Macl. (Aug.–Sept.)

A convex, oval, shining black species, half an inch in length, each elytron having four rows of rather faint punctures. It has a strongly defined ridge or keel on under surface.

1142. *Hydrobius assimilis*, Hope (Oct.–April).

Somewhat similar in form and colour to the preceding, but smaller— $\frac{1}{3}$ of an inch long—with the elytra more densely striate. It appears to be a semi-aquatic species, being often

found in large numbers under pieces of wood, &c., in the mud round the margins of water-holes.

A species of *Paracymus* occurs very plentifully in the spring and summer. It is of a shining black colour, and is about $\frac{1}{8}$ of an inch in length.

1145. *Philhydrus elongatulus*, MacI. (Sept.-Dec.)

1146. *P. maculiceps*, MacI. (Sept.-Dec.)

These are of a general yellowish tint, with darker markings. The former is about $\frac{3}{16}$ and the latter $\frac{1}{8}$ of an inch long.

7611. *Hydrobaticus australis*, Blackb. (Jan.-Dec.)

A common species, widely distributed. It is barely $\frac{1}{4}$ of an inch in length, and is dull yellow, with a black sutural stripe and two short black longitudinal lines on the prothorax. The elytra are densely striate. It is met with clinging to the under surface of pieces of floating timber, &c.

7621. *Berosus majusculus*, Blackb. (Oct.)

I have seen only one example of this. It is rather unlike the typical water-beetles, having a protruding head and very prominent eyes. It measures $\frac{1}{3}$ of an inch, and is pale yellow, with dark blotches on prothorax and elytra. The latter are strongly striate, and finely pitted with black punctures.

1154. *Hydrochus parallelus*, MacI. (Oct.-Dec.)

This is a narrow, elongate, rugose black species, with red and black legs and prominent eyes. It is about $\frac{1}{8}$ of an inch long. Usually found in the same situations as *Hydrobaticus australis*.

THE IDENTITY OF THE BUTTERFLY *MILETUS* *EUCLIDES*, MISKIN.

BY G. A. WATERHOUSE, B.Sc., F.E.S.

(Read before the Field Naturalists' Club of Victoria, 14th Nov., 1910.)

IN the Proceedings of the Linnean Society of New South Wales for 1888 (p. 1,517), W. H. Miskin described the male and the female of a *Miletus* in the collection of Dr. T. P. Lucas. To these butterflies he gave the name of *Hypochrysopters euclides*, and he stated that they came from Gippsland (Victoria).

When preparing my revisional paper on the Australian *Lycænidae* (Proc. Linn. Soc., New South Wales, 1903), I endeavoured to trace this species, but, as mentioned on page 170, Dr. Lucas wrote me that the types had been destroyed.

Some months ago it occurred to me that Miskin's description of *Miletus euclides* fitted the North Queensland species I described in the above-mentioned paper (page 270) as *Miletus meleagris*. On a recent visit to Brisbane my friend, Mr. R. Illidge, told me

he had reached the same conclusion, so I determined upon another effort to trace *M. euclides*. Dr. Lucas very kindly allowed me to examine his butterflies, and told me that many years ago he caught two species of *Miletus*, one at Port Douglas (North Queensland), and the other in Gippsland, and that both had later been described by Miskin. Miskin gives no record, neither in his papers nor in his Catalogue of the Rhopalocera of Australia (1891), of any North Queensland species belonging to this section of the genus.

Searching the collection of Dr. Lucas, I found three rather worn specimens of my *M. meleagris*; none of them bore any label, but in another place in the same cabinet drawer I was fortunate enough to notice a loose label in what I believed to be Miskin's handwriting. This label read "*Hypochrysops euclides*, Misk., Port Douglas," and I think affords sufficient proof that Port Douglas and not Gippsland was the true locality. The Gippsland *Miletus* caught by Dr. Lucas was the male of *M. hecalius*, Misk. Consequently my species, *M. meleagris*, must sink as a direct synonym of *M. euclides*, and *M. euclides* must be deleted from the list of Victorian butterflies. *M. euclides* is distinctly a North Queensland species, as we now have records from Port Douglas (Lucas), Cardwell (coll. Kershaw), Atherton (Bell), and Kuranda (Dodd). In the Macleay Museum collection are specimens of this or a very closely allied species from New Guinea.

BOOK NOTICE.

PLANTS INDIGENOUS TO VICTORIA. Vol. ii. By Alfred J. Ewart, D.Sc., Ph.D., F.L.S., Government Botanist, and Professor of Botany in the University of Melbourne. Melbourne: J. Kemp, Government Printer. 4to, with 31 plates. 10s.

THIS volume is a continuation of the publication commenced so long ago as 1860 by the late Baron von Mueller, then Government Botanist of Victoria. It was his intention to illustrate all the plants indigenous to the colony on a similar scale, but after the issue of one volume, and a supplemental part of plates, the issue was suspended, mainly on the score of expense, though a further number of plates had been prepared and printed off awaiting the completion of the necessary letter-press. These plates, which remained in store for nearly forty years at the National Herbarium, have now been collected, and, with the requisite text by Prof. Ewart, issued as vol. ii. A few new plates, mainly from the pencil of Prof. Ewart, have been added in order to make up a volume of thirty-one plates. It is no doubt advantageous that these plates have been made available to students, but a continuation of Baron von Mueller's

smaller work, "The Native Plants of Victoria," is a great desideratum. The first part of this work, illustrated by woodcuts, was issued in 1879, and deals with the dicotyledonous plants as far as the Nyctagineæ in a very helpful way. It was followed by "The Key to the System of Victorian Plants," issued in 1887-8, which has remained the student's hand-book up to the present time, though by no means an easy book for the beginner. The volume under notice illustrates the difficulties of the botanical writer, from the fact that of the nineteen names on the plates printed nearly forty years ago only nine stand at the present time, numerous alterations having been made by various authorities; thus the well-known spring flower, for many years known as *Wurmbea dioica*, goes back to its former name of *Anguillaria dioica*. Opportunity has been taken to add such popular names as have been provisionally adopted by the Plant Records Committee, the *Anguillaria* being given the vernacular name of "Early Nancy," which at any rate has the merit of being shorter than the name "Harbinger of Spring," which is now in frequent use among school children. It is almost unnecessary to say that the volume has been well produced at the Government Printing Office.

OUR SINGING BIRDS.—The following notes are taken from an article by "F. R.," in the *Australasian* of 8th October last. It has often been asserted that Australian birds are songless. "F. R." says:—"Just now the bush is full of singing birds, and I know several favourite bird haunts where the morning choruses with the first break of day are almost deafening. Even my own garden is a bower of singing birds. This morning, through the open windows of my bedroom, I heard magpies, a thrush, a pair of Rufous Thick-heads, a Brown Fantail, half a-dozen Blue Wrens, and a Goldfinch. The Goldfinch, of course, is an imported bird, and does not count. But I was interested in comparing his song with that of his native-born competitors. The song or carol of the magpie, heard on a calm spring morning, is delightful music; and how anyone can refer to it as 'noise,' and wish to shoot the author of it, quite passes my comprehension. There is a depth and richness in the magpie's carol which lifts it above the song of any of the rest of our birds, except the thrush. The thrush possesses the same kind of richness; and the deep, flute-like nature of its notes makes it easily the first of our singing-birds. But I would place the magpie a good second. The Butcher-bird, also, has a rich, full note, though not of the same refined quality as that of the thrush. The thickhead's song is of quite a different type, delightful and varied though it is. Indeed, it is the variety that is one of the chief charms of the thickhead. While listening to the bird you never know what note is coming next. Its song is loud, clear, sweet, and penetrating, and I have sat and listened to it for an hour at a time. In the depths of a deserted

forest the thickhead preferably makes its home, where the trees are not close enough together to exclude the sunlight. There the thickhead sings at any time of the day; but at sunrise and sunset he is at his best. The thickhead may be termed a shy bird; but it is by no means uncommon to find it in a garden, though it has nothing of the charming sociability of the thrush. It is a pleasing fact that our four chief singing birds are all more or less common. The magpie, indeed, is, I think, almost the commonest of our Victorian native birds. In the Western District it is particularly abundant, and is certainly not decreasing in numbers. So that its pleasing carol may be heard everywhere. It may, too, almost be heard at any time, as the magpie bursts into song at the slightest provocation. On moonlit nights it sings away by the hour; and I have heard the carol on nights that were completely dark. The thrush, though nowhere that I know of very plentiful, is still a common bird, and a pair of them may be found in any garden that has plenty of trees. Considering that the thrush is a free breeder, I have often been surprised that they are not more numerous. Possibly their nests, which are usually built close to the ground, are often raided by snakes or large lizards, or even foxes; while crows and other egg-eating birds may account for some of them. At any rate, the thrush does not appear to be doing more than holding its own. Even that, however, in these days of land-settlement and forest-clearing, is something to be thankful for. The Butcher-bird is also holding its own well; and, wherever there is a bit of open bush, fairly quiet, there you may now hear his loud ringing song. Apart from his song, the Butcher-bird is not an altogether desirable acquaintance. His appearance is not particularly striking, while his habits may be summed up in the old historian's language as 'beastly.' But his musical voice atones for his other deficiencies, and so the Butcher-bird remains on the roll of honour. The thickhead is in a class of its own. Not only is it a sweet singer; it is a lovely little thing, both in appearance and manners. Both the Rufous-breasted and the White-throated Thickhead sing beautifully, but the last-named is, in my opinion, both the best songster and the prettiest in appearance. Both are children of the bush. Indeed, I have never seen the White-throated Thickhead anywhere, except in the heart of the silent bush. The Rufous-breasted Thickhead is not so shy, and may sometimes be seen and heard in a garden; but its white-throated cousin never, or rarely, leaves the shadow of the big yellow-box and red-gum forests, where on an acacia or a spray of tea-tree overhanging an almost-hidden bush creek, I have often seen it as it poured out its evening song, until it flooded the balmy bush air with melody."

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 12th December, 1910.

The president, Mr. F. Wisewould, occupied the chair, and about 60 members and visitors were present.

REPORTS.

A report of the excursion to Kew, on Saturday, 26th November, was, in the absence of the leader, Mr. A. D. Hardy, F.L.S., given by Mr. F. G. A. Barnard, who said that the afternoon had been devoted to an examination of the various trees in portion of Studley Park. Six species of eucalypts had been noted, also several species of the larger acacias. A fair variety of birds had been noted, among which were three species of Wood-Swallows. The grounds of Yarra Bend Asylum were passed through, and some little time spent in the Kew Asylum grounds, the members being delighted with the variety of the scenery to be found within such a short distance of the city.

A report of the excursion to Beaumaris on Saturday, 10th December, was given by the leader, Mr. J. Shephard, who reported that the members were disappointed in finding that the small inlet where they had usually made good collections in previous years had become the site of a boat-house, &c., and the large flat stones, under which calcareous sponges and other shore forms were generally abundant, had been used to build a miniature breakwater. Though at low tide, the south-west wind caused too much broken water to make wading comfortable, so the members had to be content with a stroll along the shore and the examination of whatever happened to be thrown up. The results, however, were very meagre.

It was reported that the junior excursion to Williamstown on Saturday, 3rd December, under Miss J. Raff, M.Sc., had suffered from an unfavourable tide, and little collecting could be done.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. John Cronin, Botanic Gardens South Yarra, and Mr. A. Mesley, 207 Royal-parade, Parkville, were elected as members; and Miss Evereld Treweek, 151 Nicholson-street, Footscray, Miss D. Bailhache, 44 Prospect Hill-road, Camberwell, Miss Nellie Higgins, "Koornong,"

Cochrane-street, Elsternwick, and Master Wm. Mitchell, 59 Bunbury-street, Footscray, as junior members of the Club.

GENERAL BUSINESS.

Mr. G. A. Kearthland called attention to the announcement in the newspapers that it was proposed to make an alteration in the date of the opening of the quail season from 1st March to 15th February, and thought that the Club, having been instrumental in securing the 1st March as the opening day, should protest against any alteration. He therefore moved—"That a strong protest be forwarded to the officer administering the *Game Act* against any alteration in the date of opening the shooting season for quail." Seconded by Mr. A. H. E. Mattingley, C.M.Z.S., and carried unanimously.

PAPERS READ.

1. By Mr. J. Searle, entitled "Some Australian Copepoda New to Science."

The author said that for some time he had been devoting attention to the Copepoda, one of the principal orders of the Entomostraca, with a fair amount of success. He had found at Cheltenham the species recently described from Bruni Island, Tasmania, as *Brunella tasmanica*, by Mr. G. W. Smith, and during the Club excursion to Nyora on 1st November last had discovered an entirely new species, which he now described and named as *Brunella australis*. Since that he had taken another species, differing in some important details, and of a bright green colour, at Heidelberg, which he also described and named as *B. viridis*. He stated that the present season had been an excellent one for pond-life, and that other specimens he had taken would probably prove to belong to another new species.

The paper was illustrated by drawings and specimens mounted for the microscope.

Mr. J. A. Kershaw, F.E.S., congratulated the author on the work he is doing, and trusted he would continue on the same lines.

2. By Prof. A. J. Ewart, D.Sc., F.L.S., entitled "The Biological Survey of the National Park, Wilson's Promontory," part iii.

The author dealt with the results of a trip to the National Park made recently by Messrs. Audas and St. John, from which he was able to add 50 additional species, representing 39 genera, to the list of plants and ferns, making up a total of 600 species now recorded, 50 of which are naturalized aliens, the most notable plants in the present list being *Acacia longifolia*, var.

floribunda, and the fern *Polypodium grammitidis*, a rarity in Victoria.

Mr. F. Pitcher said that the statement that the Dandenong Ranges was the only other locality for the fern *Polypodium grammitidis* required modifying, as he had found the fern in the Narracan Valley.

Dr. T. S. Hall, M.A., took the opportunity of referring to the recent visit of the Committee of Management to the National Park, and briefly described what had been done since the Promontory had been placed under the control of the committee.

3. By Messrs. J. G. O'Donoghue and P. R. H. St. John, entitled "A Short Ramble Along the Lerderderg."

The authors pleasantly described a Saturday ramble along the Lerderderg, one of the streams of the Bacchus Marsh district, well known to tourists for its picturesque and rugged character. During the day a number of interesting birds and plants were met with, and recorded for the benefit of future visitors.

NATURAL HISTORY NOTE.

Mr. J. Gabriel called attention to an exhibit by Mr. C. J. Gabriel of a number of shells of the genera *Corbicula* and *Unio*. These had been obtained from mud removed from the reservoir in Studley Park when being cleaned some time ago. The genus *Corbicula* is usually found in the mud of estuaries and rivers, and whether the specimens under notice had been bred in the reservoir, which is supplied from the Yarra by means of the pumping station near Dight's Falls, or reached it in an immature state, was a point which could not be easily solved.

EXHIBITS.

By Mr. F. G. A. Barnard.—A pot-grown specimen of the *Sassafras*, *Atherosperma moschatum*, about six inches high.

By Mr. F. Cudmore.—Volcanic ashes, lava, &c., from Mt. Vesuvius; flints and fossil echinoids from Amiens, France.

By Mr. C. J. Gabriel.—Freshwater shells, *Corbicula*, sp., and *Unio*, sp., from reservoir, Studley Park; marine shells, genus *Strombus*, collected by Mr. J. Gabriel at Cairns Reef, off Cooktown, North Queensland, viz.:—*Strombus gibberulus*, L., *S. luhuanus*, L., *S. canarium*, L., *S. dentatus*, L., *S. corrugatus*, Ad. and Rve., *S. melanostomus*, Swain., and *S. columba-orosminus*, Duclos.

By Mr. J. Searle.—Specimens of Copepoda, mounted for microscope, in illustration of paper.

After the usual conversazione the meeting terminated.

WANDERINGS IN EAST GIPPSLAND.

BY J. W. AUDAS, Assistant, National Herbarium, Melbourne.
(Read before the Field Naturalists' Club of Victoria, 14th Nov., 1910.)

HAVING a week's leisure in the middle of September, and knowing that, owing to the favourable season, the vegetation in some parts of the State would be well advanced, I decided to make use of the time by revisiting East Gippsland, where the beauteous vegetation of South-eastern Victoria had charmed me on a former visit, some seven years previously.

On the journey by rail from Melbourne on the 15th of that month there was nothing of interest to note until we reached Beaconsfield, where the signs of early spring became apparent. there *Craspedia Richea* growing gregariously, *Ranunculus lappaceus* showing up well from moist spots, *Microseris Forsteri* (the Native Yam), with its solitary golden bloom, and the ubiquitous orchid, *Diuris pedunculata*, were all to be observed in the railway enclosure as we passed along.

On nearing Drouin, the emblems of Australia—the wattles—were a pretty sight. The Silver Wattle, *Acacia dealbata*, whose blooms are at perfection about August, had certainly passed its first glory, but *A. myrtifolia*, *A. leprosa*, *A. melanoxylon*, and *A. verticillata* amply compensated, and the delightful perfume from their fluffy, golden blooms, gleaming in the sunshine, wafted to the senses by every passing breeze, instilled the desire to while away the hours among them. *Anguillaria* (*Wurmbea*) *dioica*, sometimes known as the Harbinger of Spring, a modest, white-flowering plant familiar to everyone, was delivering its message of hope. The blue starry heads of another liliaceous plant, *Chamæscilla corymbosa*, and the rich yellow flowers of the Native Leek, *Bulbine bulbosa*, were in profusion. Of leguminous plants I noticed on the embankments *Dillwynia cinerascens*, *Pultenaea stricta*, var. *Gunnii*, and the two native hops, *Daviesia latifolia* and *D. corymbosa*.

Passing over the Haunted Hills, near Moe, the common heath, *Epacris impressa*, in three colours—pink, red, and white—was blooming magnificently, although, nearer the metropolis, it had passed the height of its flowering period, and was a glorious sight, stretching for miles in either direction. Nature had clothed the hills in brightest raiment of spring. Vying with the heaths for pride of place was the twiner *Hardenbergia* (*Kennedyia*) *monophylla*, locally known as Sarsaparilla, which covered the young eucalypts from root to topmost branch, stretching from one to another and forming purple arches with its flowering racemes. The Messmate, *Eucalyptus obliqua*, is the principal timber tree on these hills, but does not appear to reach the dimensions I have noticed it attain in other parts of our State.

The swollen and muddy waters of the Thomson River, near Rosedale, betokened the thawing of the winter's snow on the mountains. Thence, to Sale, we passed through a stretch of flat country, covered with huge Red Gum trees, former monarchs of the forest, but now lifeless—rung by the merciless axe of the settler—a somewhat dreary scene, broken only by an occasional sheoak, *Casuarina quadrivalvis*, and enlivened by flocks of Sulphur-crested Cockatoos, screeching among the limbs high overhead.

Between Munro and Fernbank we passed through another heathy stretch, and I was pleased to observe quite a number of early plants in bloom, such as *Hibbertia fasciculata*, *H. stricta*, *H. diffusa*, *Bossia cinerea*, *Pimelea humilis*, *Kennedyia prostrata*: the Epacrids *Leucopogon* (*Styphelia*) *virgatus* and *S. ericoides*; the Wild Lilac, *Indigofera australis*; and the red variety of the so-called "Native Fuchsia," *Correa speciosa*—the two latter being particularly fine. Near Fernbank there is an extensive apiary, and, from the nature of the surrounding country, I should consider the situation an ideal one.

Bairnsdale, 170 miles from town, is prettily situated on the Mitchell River, whose rich flats were formerly almost entirely devoted to the cultivation of hops, but which of late years have been replaced by the more profitable crops of maize and chicory. The cultivation of the latter is very interesting, and, to collect information regarding it, I visited an extensive plantation (owned by a progressive Chinese), on which Australians and Chinese work side by side. The seed is planted in drills one foot apart, and the plants thinned out to about six inches from each other. When it blooms the flowers are pinched off to force the growth of the roots, which, when matured, are dug up by running a light plough-furrow along each row. This process exposes the roots, which are similar to mangels, and very brittle. They are then chopped off by hand hoeing, the foliage slashed off, roots placed in sacks by little children at the rate of 3d. per bag, and taken to the river to be washed. Here they are tipped down a shoot to a large box-like enclosure in the river, where men wash them and pitchfork them back to the bank, where they are again placed in the sacks and carted to the roasting kilns. They are then cut up by machinery at the rate of one hundred bags per hour, and drawn by an elevator to the roasting kilns. The raw material, when roasted, is reduced to a quarter of the bulk. It is then re-bagged and sent to Melbourne, where a ready sale is always obtainable, the price being about £16 10s. per ton, but when refined it is worth £23 or upwards. An average crop is worth about £90 per acre.

My next wandering was directed towards Buchan, with the intention of viewing the famous caves. To reach there I

started from Bairnsdale by coach at 4.30 p.m. on the 16th inst. for Bruthen, 17 miles distant, the first stage of the journey. It was some considerable time since I had done any coaching, and transit on the overloaded, cumbersome coach, drawn by four remarkably staunch horses, was rather a novel experience. We had not proceeded far on the journey before I realized that the staunchest of horses would be required, for the road wound over high sand-hills, ascending continually, and when a few miles out from Bairnsdale we beheld, spread before us, the beautiful panorama of Lake King, with the Mitchell River winding its tortuous course like a silver ribbon, and the bluffs at Eagle Point gleaming golden red in the sunset. All along the coach track the timber consisted chiefly of the three eucalypts, *E. macrorrhyncha* (Stringybark), *E. viminalis* (Manna Gum), and *E. melliodora* (Yellow Box), the latter species being much infested by the parasitical mistletoe *Loranthus pendulus*. Further on we passed through fine groves of *Banksia serrata*, the saw-leaved Banksia, whose graceful foliage lent quite a park-like appearance to the view; otherwise, the country was rather hungry looking, being covered with bracken, sedges, and tea-tree, but the prosperous appearance of numerous large orchards amply demonstrated that this so-called third-class land is well adapted for fruit-growing.

The first stoppage was at Sarsfield, on the Nicholson River, in the vicinity of which I noticed the following leguminous shrubs in bloom—viz., *Daviesia ulicina*, *Pultenæa scabra*, *P. daphnoides*, *Platylobium formosum*, *Acacia juniperina*, and *A. suaveolens*; and just after crossing the river we beheld masses of *Prostanthera rotundifolia*—covering quite an acre of ground, and of the unusual height of 8 to 12 feet—the beautiful purple flowers of which drew admiring remarks from the passengers. This shrub is, in my opinion, one of the best of our Labiates, and is well worthy of trial in our gardens. Thereafter we descended even more steeply than we ascended, and negotiated a part of the road known as “Dirty Hollow,” so named by the bullock drivers on account of the very difficult and dirty state of the track; and I certainly breathed more freely when we were safely over, and registered a mental note that the pinch deserved the title.

On the rich Tambo flats at Bruthen is situated the largest peach orchard in Victoria, from which the fruit is shipped to a canning factory at Bairnsdale. This ended the first stage of the journey, and I rested the night at the Star Hotel, but was astir early the next morning, as the coach left for Tara at the unearthly hour of 4 a.m. Outside Bruthen the Tambo River reaches its greatest width, and it is spanned by a magnificent bridge of recent construction.

Between Bruthen and Tara the country is rather monotonous. Dense forests of stringybark occur, blackened by recent fires, with occasional patches of grass-trees, *Xanthorrhæa australis*, commonly called in these parts "black boys."

The exigencies of travel, owing to recent rains, made it necessary for all to descend and walk—or, as the driver jocularly styled it, to do the trip "per boot." This enabled me to penetrate some distance from the coach track, and I was rewarded by finding a good many interesting plants in bloom—viz., *Styphandra glauca* (with its sky-blue flowers), *Stackhousia linariifolia*, *Spyridium parvifolium*, *Grevillea alpina*, *Acacia juniperina*, *Platylobium obtusangulum*, *Hibbertia obtusifolia*, *H. stricta*, *Hovea heterophylla*, *Leucopogon australis*, *Tetratheca ericifolia*, *Pimelea axiflora*, *Epacris microphylla*, with its sweet-scented spike of white flowers, and *Comesperma ericinum*, with *C. volubile* twining round the tea-trees and seedling eucalypts. On a deep sandy cutting I gathered some lovely specimens of *Leucopogon* (*Styphelia*) *ericoides*, which gave forth a delightful perfume. The only types of Australian fauna met with were a number of kangaroos, which stood inquiringly on the roadside; but, on being informed by the coach-driver that there was no mail for them, they jumped hastily off into the bush again.

At Tara, where we changed coaches for Buchan, the recently discovered and valuable manganese mine is being worked, and here also have been found specimens of tin ore, which, if obtainable in sufficient quantities, should open up a good industry. Finding that the change of coaches at this stage would cause an hour's delay, and being anxious to make use of all available time for botanizing, I informed the driver of my intention, and pushed forward on the road to Buchan. Lining the banks of the Tara Creek for a considerable distance, *Acacia verticillata*, laden with dense cylindrical spikes of yellow flowers, gave a bright note of colour to the scene. Along the bed of the creek the vegetation was very beautiful, *Clematis aristata* covering all the tea-tree and hazel with a veil of white. Ferns were numerous. *Asplenium bulbiferum*, *Lomaria discolor*, *Aspidium aculeatum*, and *A. decompositum* were growing thickly at the water's edge, crowding each other out. Mixed up with them were the handsome *Dianella revoluta* and the graceful foliage of the tall saw-sedge *Gahnia psittacorum*, while *Arundo phragmites*, "the common reed," shot up abruptly near them. Some fine specimens of *Eucalyptus regnans* were met with, attaining a height of over 150 feet. The boles of many of these trees were as straight as a gun-barrel, and appeared in snow-white garments, having recently shed the epidermis or thin outer layer of bark, while, hanging from others, were long shreds of

bark, which were being carried away by every passing breeze, leaving the trees at last quite white and smooth.

After covering four more miles without meeting with any plants of special interest, I was delightfully surprised by coming suddenly upon large quantities of *Prostanthera hirtula*, and was fortunate in obtaining specimens in three shades of colour—mauve, pink, and purple. At this stage I was overtaken by the coach, and thence to Cani I noted only *Casuarina distyla* (Stunted Sheoak), *Hakea nodosa*, and *H. acicularis* (Needle bush), which were in flower. All along the flats of Cani Creek the Red Bottle-brush, *Callistemon lanceolatus*, predominated, and here the bird-life became more interesting. The Bell-birds' musical note could be heard from the bottle-brushes. Blue Wrens flitted here and there, while Choughs and Grey Magpies were abundant among the taller trees. On rounding a sharp curve, the coach nearly ran over a Bronze-wing Pigeon, which seemed too tame to hurry out of the way. Here and there were seen *Persoonia linearis*, Narrow-leaved Geebung, and, although not in flower, they were still very ornamental. This is a tall shrub, attaining a height of about 15 feet, and belongs to the Proteaceæ, but it resembles many of our acacias.

Stretching for a considerable distance beyond Cani, the eucalypt *E. pulverulenta* was the principal forest tree. Its timber, bark, and inflorescence greatly resembles that of *E. Stuartiana* (Apple Gum), but the foliage is more glaucous or mealy-white, and has the appearance of having been covered with powder, and is, therefore, often known vernacularly as "powdered gum." The Red Bean-climber, *Kennedya rubicunda*, showed up conspicuously, climbing amongst a clump of dead wattles. Growing in close proximity were two species of acacia, *A. diffusa* and *A. discolor*—the former was in full bloom, while the latter, one of the earliest bloomers, was in fruit.

We then entered a very dreary stretch of country, the vegetation of which consisted almost entirely of poor quality messmate, *Eucalyptus obliqua*, the ground being absolutely bare beneath them, not a blade of grass being visible, the only green to relieve the eye being an occasional Native Cherry, *Exocarpus stricta*. Just here, for the first time on the journey, I heard the hoarse cry of the Gang Gang Cockatoo. As we suddenly emerged from the thick timber, the verdant hills of Buchan were spread out before us, with the township nestling in a hollow, and the winding river in the centre. At a homestead by the roadside I observed a beautiful grove of olives, *Olea europæa*, which were exceedingly flourishing, and laden with fruit. These trees, besides being profitable, afford excellent shelter, and I have noticed in other parts that they are being extensively planted. Descending a remarkably steep grade, we entered the town,

and I was pleased to find superior accommodation—for so far back—at Riverview House, a tourist accommodation house conducted by Mr. J. C. Wyatt.

The show places of Buchan are certainly the caves, of which many are known about the district, and which compare very favourably with those of other States; but, to my mind, the place itself, with its beautiful wooded gullies, steep hills—many cultivated to the very summit, and others rugged and serrated, and almost inaccessible—proved more interesting. These hills are of Devonian marine limestone. Near the entrance to Moon Cave is an exposure of beautiful black marble. The soil on the hills is rich chocolate and on the flats black. Maize and oats are the principal crops grown, and an idea of the fertility of the district may be gathered from the fact that splendid crops of oats have been grown on one block of land uninterruptedly for a period of thirty years without the addition of manure of any kind. Crops of maize grown on the flats average 80 bushels per acre, but many go over 100. It seemed to me a pity that land so fertile should be mainly devoted to sheep; but the farmers, in growing root crops, are handicapped by the difficulty of getting the produce to market, cartage to Mossiface and freight by boat to Melbourne amounting to about 60 per cent. of the returns for their labour.

Immense numbers of cockatoos abound, so numerous as to cover the willows along the river with white. One settler described them to me as “the white labour,” because they picked the crops and made no charge.

On the 17th I set out to investigate the flora at the head of Spring Creek, which flows to the westward of the township. Along the valley the air was thick with the perfume of the Scrub Boxwood, *Hymenanthera Banksii*, which abounded thickly, and whose tiny creamy flowers, hidden under narrow sage-green leaves, proved greatly attractive to wild bees, which were busy among them. *Tristania laurina*, “kanooka,” a fairly large myrtaceous tree with yellow flowers, and *Casuarina suberosa*, black oak, an erect-branched sheoak reaching a height of about 40 feet, were very plentiful all along the creek, and near by the Peppermint Gum, *Eucalyptus amygdalina*, was laden with its lovely fluffy blooms. At the waterfall near the head of the creek the scene was very pretty, all the rocks and fallen timber being covered with mosses and ferns. Among the latter were the spotted po'ypody, *Polypodium pustulatum* and *P. australe*, while *Cheilanthes tenuifolia*, the rock fern, nestled under the boulders. I only noted one shrub of *Hakea eriantha*. Woolly-flowered *Hakea*, which was well out in bloom.

Nearly all the timber and shrubs close to the creek was infested by the lichens *Ramalina leiodea*, var. *fastigiata*, *Thelo-*

schistes chrysophthalmus, and *Usnea barbata*, var. *scabrida*, which have caused considerable damage and destroyed much of the beautiful vegetation. The by-waters were covered by the green veil of fresh-water algæ, and struggling through the openings of which could be seen *Myriophyllum variifolium* (water milfoil), a partially submerged plant of the Haloragææ, and at the water's edge tempting water-cress grew luxuriantly. Hidden in this secluded valley, the birds flitted about in security. I noticed the pretty little blue wrens, fantails, tomtits, robins, rosellas, and wattle-birds, while a large owl surveyed the scene solemnly from the topmost branch of an adjacent gum-tree. I thought it was early for martins, but a good many were flying about, as also were many swallows.

By making a detour, I was able to rejoin the course of the Buchan River some five miles further on, and followed it back to the township. Along this stream—like many other Victorian rivers—wattles predominated, but here *Acacia decurrens*, var. *mollissima*, a variety of the Black Wattle, was not in bloom, and would not attain its full glory until nearly Christmas. A few nice specimens of *Olearia* (*Aster*) *stellulata*, Snow-bush, were growing near the water's edge, and its corymbs of pure white flowers made a mass of white. The Silky Tea-tree, or Manuka, *Leptospermum pubescens*, was just past flowering. About three miles out I came upon a few nice specimens of the Snow Gum, *Eucalyptus pauciflora*, the fruit capsules being much larger than usual. The introduced spotted thistle, *Carduus Marianus*, grew thickly on the flats near the river. The pretty pink flowers of *Convolvulus crubescens* made the green sloping banks lovely to behold, and in places I found quantities of the pretty blue-flowered *Erodium cygnorum*, with a native composite, *Cymbonotus Lawsonianus*, which bears a great resemblance to the introduced Cape Weed, *Cryptostemma calendulaceum*. For some distance along the river were beautiful willows, which should, to a great extent, prevent the erosion of the banks during floods. The water lizards, *Physignathus lesneuri*, were very numerous along the banks, and it was very interesting to see them diving and swimming away. Platypus made their homes along the stream, their burrows being very numerous; but these animals are of so timid a nature that one is rarely rewarded by seeing them. Rows of cormorants, perched upon the willows in the form of a pyramid, were watching for fish. The familiar mud-lark and the peculiar, distinctive cry of the plover, disturbed by my approach, was heard all the way along. One very large Eaglehawk flew overhead, pursued by crying magpies.

On the 18th I started on a trip to the Snowy River basin, in the direction of Mount M'Leod, some fourteen miles distant, and, having a light conveyance and smart pair of horses, was

able to get over the distance quickly. The road, for nearly the whole distance, was cut out high up on the sides of precipitous hills, and, although recently made and regraded in parts, was still very dangerous, so that it would be hard to conceive what it must have been before these improvements; and one particular pinch, known as "Breakneck Bend," would try the strongest of nerves.

Although the scenery was magnificent, I was somewhat disappointed to find so little variety of vegetation, flowering plants being very scarce. Along the road were the following eucalypts:—*E. pauciflora*, *E. stellulatus*, *E. eugeniioides*, *E. melliodora*, *E. amygdalina*, *E. obliqua*, *E. macrorrhyncha*, *E. polyanthemos*, and *E. goniocalyx*, the latter being particularly fine. Near Kingsley, *Cassinia aculeata*, sifting bush or dogwood (as called in these parts)—a plant which, if handled, has an irritating effect upon the skin, known as "mountain itch"—was very abundant.

After fording the Murrindal River, I came upon the most beautiful specimens of *Acacia longifolia*, var. *floribunda*, I have ever seen. The leaves could scarcely be detected among the dense masses of yellow flowers, which covered the ends of the branches, and their peculiar pungent smell (which characterizes this tree) was perceptible at a considerable distance. The shrubby Salisbury Pea, or Native Laburnum, *Goodia lotifolia*, was blooming on the slopes. I passed a band of rich red marble, which, even in its rough state, would excite admiration. On a point just where the Raymond River enters the Snowy, the scenery is particularly grand. Huge grey, serrated cliffs stand up abruptly some hundreds of feet, and the Snowy River dashes its turbulent waters beneath them. Peeping from the edges of these cliffs, in inaccessible places, were seen various plants which delight in sheltered situations, such as *Adiantum æthiopicum*, or maiden-hair fern, a pretty, tender species of one or two feet in height; *Asplenium flabellifolium*, or rat-tail fern; and the pretty little *Lindsaya linearis*. Growing snugly between the rocks was the Native Elderberry, *Sambucus Gaudichaudiana*, an herbaceous perennial plant with showy heads of white flowers, also *Lasiopetalum dasyphyllum*, a Sterculiaceae plant, the young leaves of this shrub having a very rusty tomentum. The Orchidaceous plants on the top of the cliffs were *Pterostylis nutans* and *Glossodia major*, commonly known as "parson in the pulpit," in two colours, purple and white. Here, *Eucalyptus amygdalina* was a mass of flower, and on one specimen a flock of parrots perched, chirping with joy while robbing the blossoms of their nectar.

Early on the morning of the 19th, while the township was wrapped in slumber beneath its veil of river mist, I ascended

the wooded heights of Mt. Dawson, which lies to the south-west of Buchan, and, crossing the summit, descended into a pretty valley, along which wandered a crystal stream, whose waters made soothing harmony in their gurgling descent. Here the vegetation was very dense and luxuriant, consisting chiefly of *Bursaria spinosa*, a fine flowering tree, with blanket-wood, hazel, musk, &c. Although at Spring Creek I had noticed only one plant of *Hakea eriantha*, the stream here was lined with it. The beautiful scarlet-flowered Bottle-brush, *Callistemon lanceolatus*, was in abundance. It is a shrub of 10 to 15 feet in height, with large brush-like spikes of rich vermillion flowers. Growing grandly on the precipitous hills were many fine kurrajong trees, *Brachychiton populneus*. This tree attains a height of about 40 feet, and has a straight, clean, regular trunk, and dark, rough bark. The Native Pepper, *Drimys aromatica*, with its small white flowers, nestled snugly beneath them, making the air heavy with its fragrance, while the Coral Fern, *Gleichenia circinata*, sprang from the fissures of the rocks, and clustered thickly on the slopes of the hills in places reaching nearly to my knees, and the Appleberry, *Billardiera scandens*, twined round the smaller shrubs. The eucalypts which occur here are *E. pauciflora*, Snow Gum; *E. viminalis*, Manna Gum; *E. sideroxylon*, Red Ironbark; *E. globulus*, Blue Gum; *E. obliqua*, Messmate; *E. melliodora*, Yellow Box; *E. eugenioides*, White Stringybark; *E. goniocalyx*, Spotted Gum; and *E. macrorrhyncha*, Stringybark. The last-named was beautifully decorated with the gay *Loranthus pendulus* (Mistletoe), which hung gracefully from the branches to a length of 12 or 15 feet. Wallabies were very numerous, some being almost black in colour.

Near Bruthen, on the return journey, my attention was attracted by a most unusual sight, which I had not observed on the trip up. This was the Mistletoe, *Loranthus pendulus*, growing on *Cassinia aculeata*, both being in flower: and another peculiarity of this very unusual growth was that the parasite grew from the host in a thick stem equally as sturdy as its own branches, and not, as is generally seen, from a bump or rooty formation on the bark. Here some fine young specimens of *Panax sambucifolius*, an ornamental Araliaceous shrub, were met with, and, having secured a nice young plant, I brought it to Melbourne, and presented it to the Curator of the Botanic Gardens.

Early on the 21st, mounted on a good strong horse, I set out from Bairnsdale for Mt. Taylor, situated 11 miles to the north-west of that town, and, after a strenuous ride, reached the foot in about two hours' time. Leaving my horse at the residence of Mr. Harvey (on whose property the mount is

situated, and to whom I am indebted for much interesting information regarding the locality), I ascended the mount, the base of which is of granitic formation, while the summit is sandstone, of the same age as the old red sandstone of Scotland. Natural vegetation has all been removed from the sides of the mount, but on the summit, 1,700 feet above sea level, where a trigonometrical station is situated, *Tecoma australis*, var. *Latrobei*, a long, woody climber, was trailing over the rocks, covering them with its pretty blooms of a rich cream colour, with inner circle of carmine. This lovely plant, and four other twiners or climbers, comprised nearly all the flowering vegetation. On the summit, *Comesperma volubile*, a glabrous twiner, spread thickly over the young Silver Wattles, *Acacia dealbata*, both being in flower, and the vivid blue of the twiner and the gorgeous yellow of the wattle made a pretty sight. *Clematis aristata*, which I met in every locality on my wanderings, was here particularly luxuriant, the foliage of the young eucalypts being quite hidden from sight by its flowers, while the magnificent growth and bright red-coloured flowers of *Kennedyia rubicunda*, a large twining species of the Leguminosæ, everywhere attracted the eye. A wiry-stemmed liliaceous climber, *Eustrephus Brownii*, peculiar to this part of the State, was forging its way over the boulders. *Eucalyptus eugenioides*, *E. pulverulenta*, *E. sideroxylon*, *E. globulus*, *E. polyanthemus*, *E. melliodora*, *E. obliqua*, *E. macrorrhyncha*, and *E. amygdalina* comprised the eucalypts. They were not superior specimens, but still had grown up sufficiently to somewhat obscure the view, which, from the top, is very extensive. To the west lay Mt. Lookout, at the foot of which was the once famous Boggy Creek gold mines, and where mining is still carried on in a desultory way. Away in the distance were the Lindenow maize flats, whose richness is maintained to vie with those of Orbost; and, beyond Bairnsdale, the view of the beautiful lakes extended right to the Entrance. With a good field-glass the vessels may be seen making the Entrance on a clear day, and, when rain is threatening, their whistles can be distinctly heard on the summit—this latter fact constituting a farmer's barometer. The luxuriance of the leguminous vegetation about this part is due to the absence of frost, peas being extensively grown in winter and sent to Melbourne, with profitable results. The only bird-life seen on the mount was a solitary Laughing Jackass, giving forth his peculiar guttural laugh from his perch on a dry eucalypt branch. A great quantity of the railway sleepers, telegraph poles, and beams for bridge work are obtained near the mount.

I returned to Melbourne on the 22nd, having travelled considerably over 600 miles, and examined an extensive stretch of country, feeling greatly pleased with the trip.

SOME VICTORIAN COPEPODA NEW TO SCIENCE.

(With Three Plates.)

BY J. SEARLE.

(Read before the Field Naturalists' Club of Victoria, 12th Dec., 1910.)

THE object of this short paper is to record the occurrence in Victoria of four species of Copepoda belonging to the genus *Brunella*.

Some three years ago, Mr. G. W. Smith, of the Oxford University, discovered on Bruni Island, Tasmania, a small Copepod whose structure differed so much from any fresh-water species hitherto known that it was found necessary to form a new genus for its reception. From the fact that the specimen was found on Bruni Island, and was not met with in any other part of Tasmania, Mr. Smith called the genus *Brunella* and the species *tasmanica*.

From the description * of the genus, kindly forwarded to me by Mr. Smith, I was confident I had met with a similar species here before I took up the systematic study of the group, and have kept a look-out for it since.

On the 22nd of October, while collecting at Cheltenham, I had the good fortune to take a number of specimens corresponding exactly with *Brunella tasmanica*, and this is the first record of the genus for Australia.

On 1st November, while at Nyora with the F.N.C. excursion, I was successful in capturing a new species of this interesting genus in a weedy pond near the railway line. It is much larger than *B. tasmanica*, and differs somewhat in the formation of the fifth thoracic limbs of the male and in the lateral projections on the fifth thoracic segment of the female, while the tenth, eleventh, and twelfth joints of the first antennæ in both male and female are bright red in colour, the rest of the antennæ being pale green.

I took this species in every form of development—from the nauplius to the ovigerous female—also two specimens which were attacked by a fungus, the threads of which were growing out between the joints of the animal's body and limbs.

I have called this species *Brunella australis*.

On 12th November fortune again favoured me with yet another species of *Brunella*. When living this specimen was of a most beautiful iridescent green colour. Its general appearance is similar to *B. australis*, but, while retaining the general characteristics of the genus, it differs somewhat in structure from that species.

I have called this species *Brunella viridis*.

The fourth species was taken in the Yan Yean Reservoir,

* Trans. Lin. Soc. London, vol. xi., pt. 4, 1909.

and, from the shape of the fifth thoracic limb of the male I have named it *Brunella ampulla*.

The following is a detailed description of the genus and species recorded :—

ORDER—COPEPODA.

FAMILY—DIAPTOMIDÆ.

GENUS—*Brunella*.

The distinguishing features of the thoracic limbs in the genus *Brunella* are—

- (a) The first thoracic limb has the outer branch (exopodite) 2-jointed, and the inner branch (endopodite) 1-jointed.
- (b) The second, third, and fourth limbs have the outer branch 3-jointed and the inner branch 2-jointed.
- (c) In the male the fifth thoracic limbs differ from each other. The right limb has the outer branch 2-jointed, the last joint being spatulate and tipped with a small spine ; the inner branch of this limb is 2-jointed, with an extra internal lobe. The left limb has the outer branch 3-jointed, and ending in a very long curved claw ; the inner branch of this limb is 3-jointed.
- (d) In the female the fifth thoracic limbs have the outer branch 3-jointed and the inner branch 2-jointed.

This combination of characters is found in no other fresh-water Copepod.

BRUNELLA TASMANICA, G. W. Smith.

Female.—The body is cylindrical. The head segment has a slight lateral depression, and tapers towards the front, and is longer than the two following segments.

The fifth segment has small lateral projections, which are two-lobed, the larger external lobe having rounded ends, the inner lobe small and more sharply pointed. The first abdominal segment is somewhat swollen, and the operculum or plate covering the genital openings is very large. The abdomen has three distinct segments, and the furcal processes are segmented from their base, which might almost be called another segment. The furcal processes are as long as the first abdominal segment, and are each furnished with five plumose setæ—four terminal and one lateral. These setæ are nearly half as long again as the furcal processes.

The first antennæ exceed the body in length, and consist of 27 joints. The second antennæ, mandible, maxilla, and maxillipedes are similar in structure to those of *Boeckella*.

The first thoracic limb has the outer branch 2-jointed and the inner branch 1-jointed. The second, third, and fourth limbs closely resemble each other, and have the outer branch 3-jointed and the inner 2-jointed. The fifth limb of the female has the

outer branch 3-jointed, the second joint carrying a stout spine, which is not plumose; the inner branch is 2-jointed.

Colour.—Green.

Length.—.75 mm. to 1 mm.

Occurrence.—Cheltenham, Victoria.

Distribution.—Bruni Island, Tasmania.

The Male.—The male is somewhat smaller than the female. The abdomen has five distinct segments, and the antenna on the right side is geniculated or jointed in such a manner as to be used as a clasping organ.

The fifth pair of legs are very remarkable. The right leg has the outer branch 2-jointed, the joints being flattened and expanded: the second joint terminates with a short, stout spine. The inner branch is 2-jointed, the second joint bearing four long setæ. The other joint has a peculiar lobe or projection on it, and yet another internal lobe attached to its base. The left leg has the outer branch 3-jointed, the last joint being prolonged into a curved spine or claw. There is a small spine at the top of the first joint, and another small spine on the inner base of the claw. The inner branch is 3-jointed, the last joint bearing four setæ.

BRUNELLA AUSTRALIS, J. Searle, n. sp.

This is a larger and more beautiful species than *B. tasmanica*. The structure of the mouth parts and number of joints in the thoracic limbs agree with *B. tasmanica*, the principal differences being—

Female.—In the female the lateral projections on the fifth thoracic segment are very conspicuous, the outer lobes being long and pointed, the inner very small and rounded at the end. The fifth pair of limbs have one or two additional spines or setæ on the external branch.

The first antennæ have, at about equal distances apart from base to top, four setæ that are very much longer than the other setæ on the antennæ, and extend forward, while at the end of the third last joint there is a long seta that extends backwards. The tenth, eleventh, and twelfth joints of each of the first antenna are of a bright red colour, contrasting greatly with the rest of the antenna, which is of a pale green colour.

Male.—As is general with the Copepoda, the male is smaller than the female.

The fifth pair of legs are even more remarkable than those of *B. tasmanica*. In the right leg the second joint of the external branch, instead of being spatulate, as in *B. tasmanica*, is placed somewhat at an angle with the first joint, and is curved outwards and rounded at the end, the concave surface being covered with minute projections or spines. The left leg has a small spine on the first joint of the outer branch, a longer

spine on the second joint, but has no spine on the claw. These curiously shaped limbs are used by the animal during copulation, though the exact manner in which they are used is still somewhat obscure, the act being so rapid that the eye could not grasp every movement of the limbs, though it has been observed repeatedly. What happens appears to be this:—The male, with his right antenna, clasps the female, and hooks the long curved claw of the left thoracic foot round her abdomen. At first the female struggles to escape from his embrace, and thus locked together they pull each other about the observation tank, finally sinking slowly to the bottom of the tank, where they may remain several hours, or, again, the whole act may be accomplished in a few seconds. When the psychological moment arrives, the male appears to lift the operculum of the female with the curious second joint of the right leg, while the spermatophore is attached by its open end, which is the last part to leave the body of the male, close to the genital opening of the female, the leg, I think, being used to attach it, the whole act being accomplished in about $\frac{1}{5}$ of a second.

Colour.—Green, with red band on the antennæ.

Length.—1.75 mm.

Occurrence.—Nyora, 55 miles S.E. from Melbourne.

BRUNELLA VIRIDIS, J. Searle, n. sp.

In appearance and size this species resembles *B. australis*, but is of a beautiful iridescent green colour when living.

Female.—The head and segment fused to it is longer than the succeeding two segments, the head being more rounded than *B. australis*. The lateral projections on the fifth thoracic segment differ from those of *B. australis*, and it does not possess the red band on the antennæ.

Male.—The fifth pair of legs of the male differ from those of *B. australis*, as shown in the figure.

Colour.—Iridescent green.

Length.—1.75 mm.

Occurrence.—Heidelberg.

BRUNELLA AMPULLA, J. Searle, n. sp.

This is a small species, and was taken in a tow-net, together with several other species of Copepoda.

Female.—Head and segment fixed to it is longer than the two following segments. The fifth thoracic segment has lateral projections that are not symmetrical—that on the right side being longer than that on the left, and the ends are rounded. The first antennæ are longer than the extreme length of the animal, and contain 25 joints. The second antennæ are smaller than is usual, while the mandibles, maxillæ, first and second maxillipedes are large in comparison with the size of the animal, and the setæ that terminate the first-fourth thoracic

limbs are extremely long. The fifth thoracic limbs have the characteristic spur on the second joint of the external branch, the inner branch being 1-jointed.

Male.—The male is smaller than the female. First antenna geniculated on the right side; fifth thoracic limb—on left side, external branch 3-jointed, the second joint carries a spine on the inner side, the last joint being prolonged into a claw. Inner branch 1-jointed, of a peculiar shape, well adapted for clasping or holding. Right limb, external branch 1-jointed, swollen in the middle, and then tapering like the neck of an ancient flask or vase, the end then expanding on one side, and furnished with minute hooked setæ. Inner branch also 1-jointed, straight, much longer than the outer branch, and terminating in four stout setæ.

Length.—75 mm. to 1 mm.

Colour.—Green.

Occurrence.—Yan Yean Reservoir.

Distribution.—Keilor-road, Essendon (collected by Mr. E. Creed).

DESCRIPTION OF PLATES.

PLATE XII.—Fig. 1, *Brunella australis*, female, $\times 35$. Fig. 2, maxillipede, male. Fig. 3, right, first antenna, male. Fig. 4, second antenna, male. Fig. 5, fifth thoracic leg, male, left. Fig. 6, fifth thoracic leg, male, right. Fig. 7, fifth thoracic leg, female.

PLATE XIII.—Fig. 1, *Brunella viridis*, female, $\times 35$. Fig. 2, fifth thoracic leg, male, right. Fig. 3, fifth thoracic leg, male, left. Fig. 4, maxillipede, male. Fig. 5, first antenna, male. Fig. 6, fifth thoracic leg, female.

PLATE XIV.—Fig. 1, *Brunella ampulla*, female, $\times 35$. Fig. 2, second maxillipede, male. Fig. 3, fifth thoracic pair, male—*R* right, *L* left. Fig. 4, fifth thoracic leg, female. Fig. 5, biting edge of mandible. Fig. 6, first maxillipede, male. Fig. 7, maxilla, male.

BIOLOGICAL SURVEY OF WILSON'S PROMONTORY.

FLOWERING PLANTS AND FERNS—THIRD REPORT.*

BY ALFRED J. EWART, D.Sc., Ph.D., F.L.S., Government Botanist and Professor of Botany and Plant Physiology in the Melbourne University.

(Read before the Field Naturalists' Club of Victoria, 12th December, 1910.)

As the result of a third visit to the National Park, Messrs. Audas and St. John brought back a third collection of the flowering plants and ferns from the National Park, which, on examination, were found to include a number of species hitherto unrecorded, the names of which are given in the accompanying list. They include a number of water plants, for which a special search was made, and, in addition, two non-flowering

* For first report, with map, see *Victorian Naturalist*, vol. xxv., p. 142 (January, 1909); for second report, *idem*, vol. xxvi., p. 129 (January, 1910).

PLATE XII.

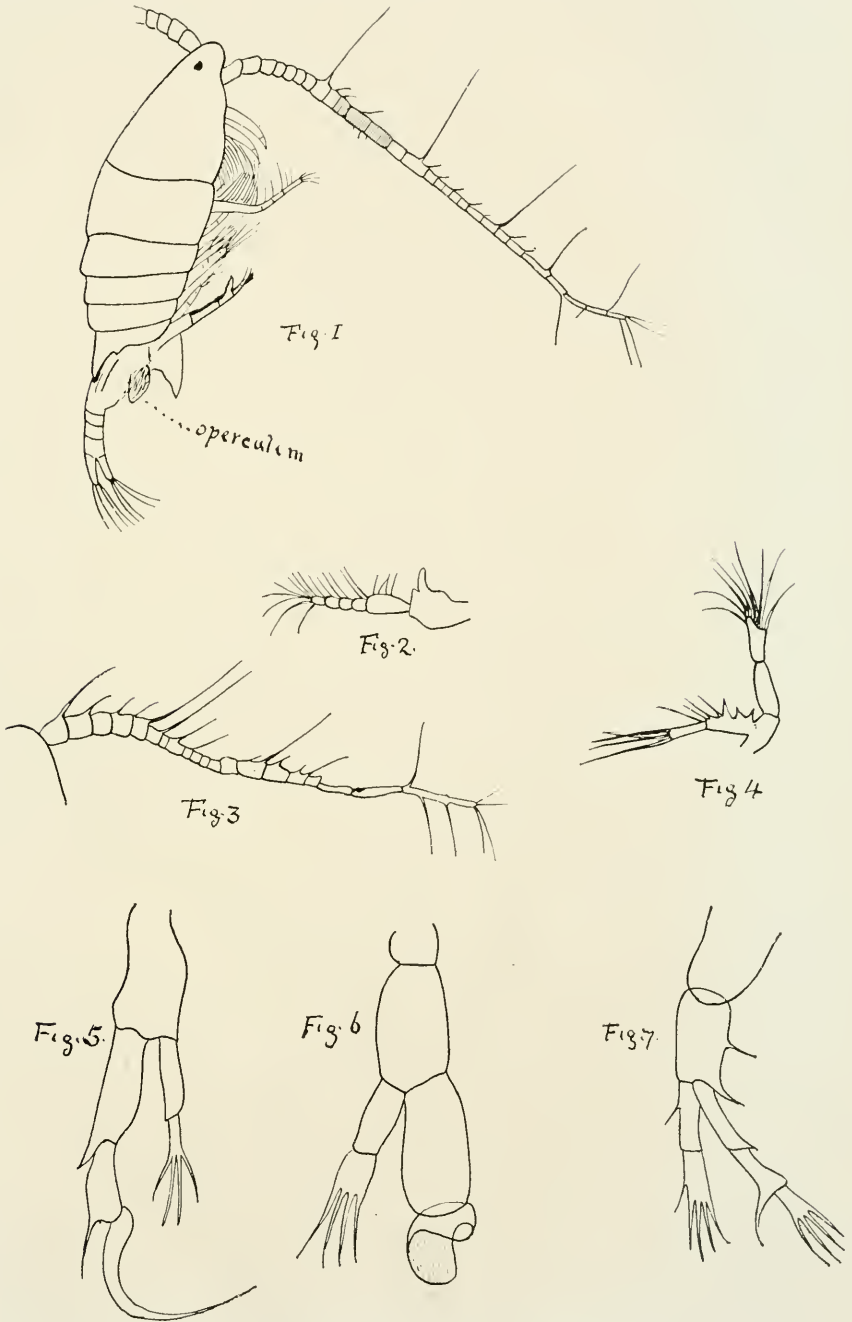


PLATE XIII.

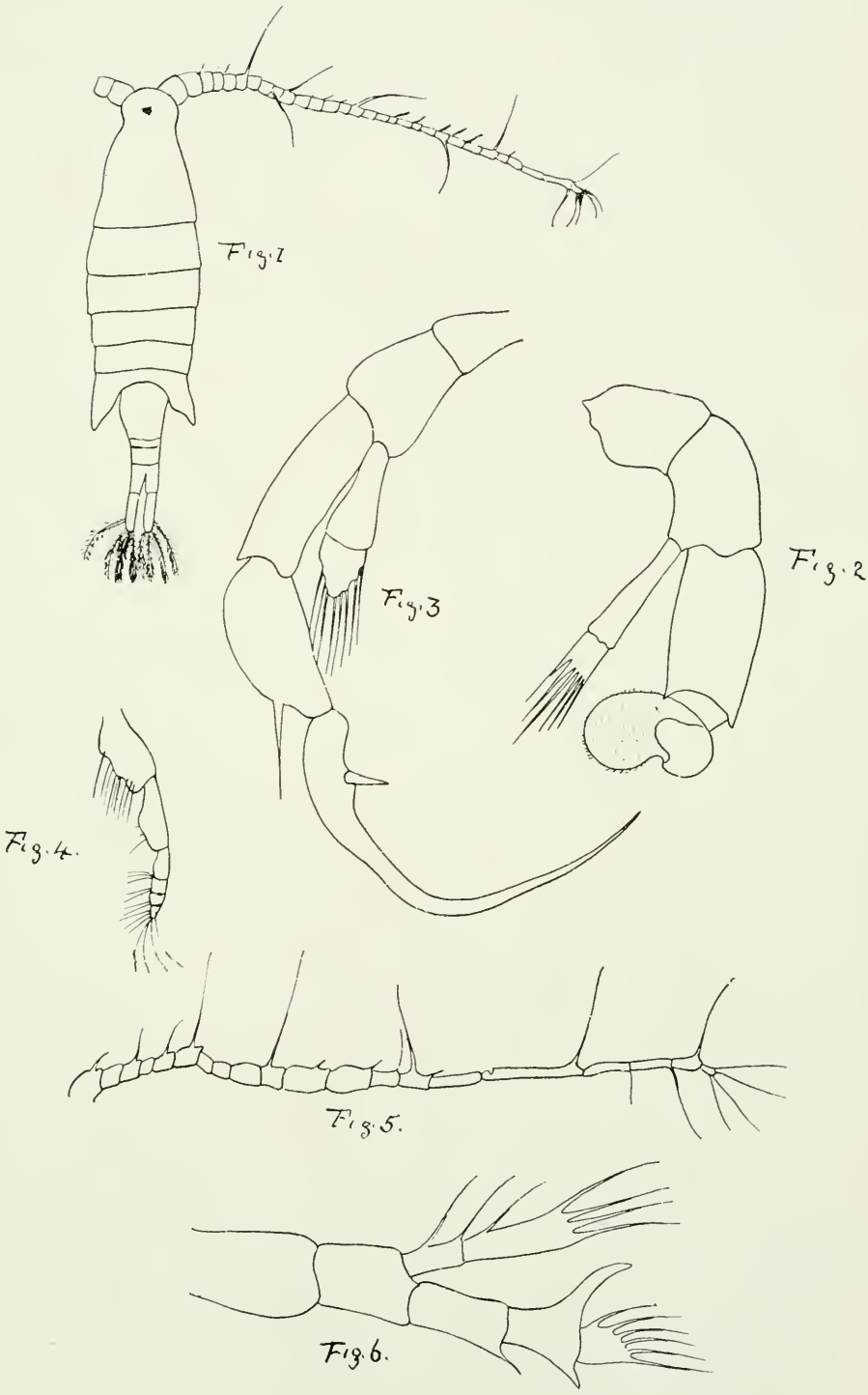
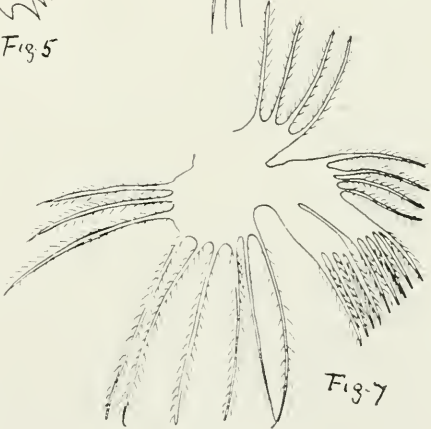
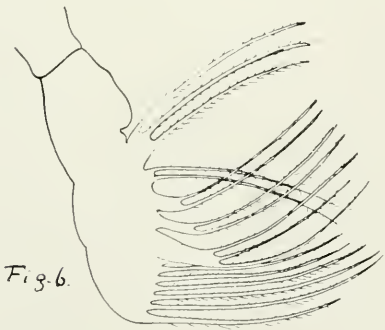
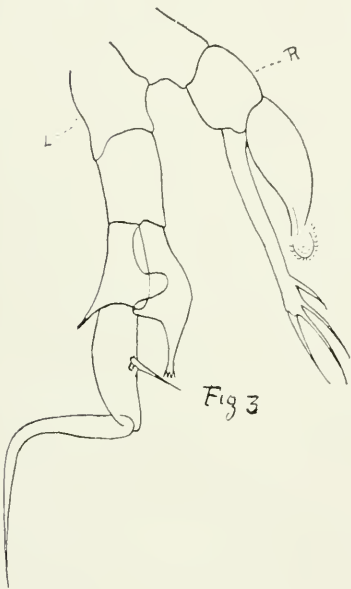
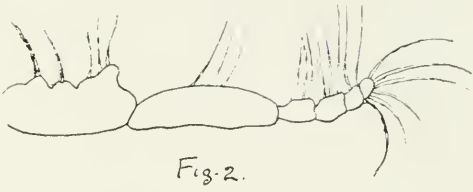
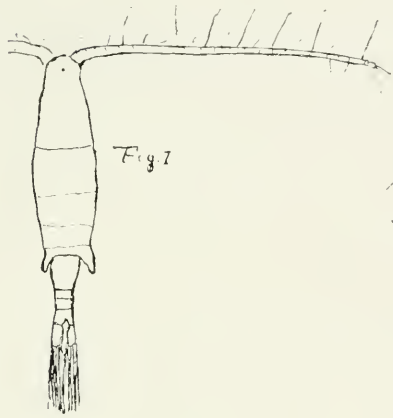


PLATE XIV.



plants—namely, *Chara fragilis*, Desv., and *Nitella gelatinosa*, A. Br.—were found growing in fresh water near Five-Mile Beach. The number of plants on the present list is naturally small as compared with the numbers obtained in previous years, and it is not likely that any appreciable number of flowering plants or ferns remain to be recorded for the National Park. During the present year, in fact, several parts traversed by Messrs. Audas and St. John in previous years were closely re-examined, but without the addition of a single unrecorded species to the list. The present list includes 40 genera and 50 species, of which latter 42 species are native to Victoria and 8 (marked with an asterisk in the list) are naturalized aliens. Excluding, therefore, one or two doubtful specimens which may ultimately be added to the list, the total for the National Park consists of exactly 600 native flowering plants and ferns and 50 naturalized aliens. One-twelfth of the flora, therefore, consists of naturalized aliens, whereas approximately one-fifth of the flora of the whole of Victoria consists of naturalized aliens. The difference is, however, much more striking than this comparison shows, for in the National Park the naturalized aliens are for the most part sparsely and sparingly distributed, and they seem only able to hold their own in special localities, where the interference of man has brought about the conditions needed for their successful development. In some cases, more particularly along the tram track at Sealers' Cove, thistles, for instance, seem to be much less abundant than they were in former years, and they do not seem able to successfully establish themselves among the undisturbed native scrub.

Two plants are worthy of special comment—

Acacia longifolia, Willd., var. *floribunda*.—This specimen, though without flowers or fruit, apparently belongs to this variety, but the phyllodes are longer and narrower than usual, some of them exceeding 6 inches in length.

Polypodium grammitidis, R. Br.—This interesting fern is mainly Tasmanian, being usually found among alpine rocks or gullies. It is only known in Victoria from the Dandenong Ranges, so that the plant from the National Park forms an interesting link with the Tasmanian flora.

Now that the list of the flora of the National Park is completed, it may be found advisable to construct a small handbook or key to the flora of the Park for the benefit of visitors. Such a handbook would, however, be of temporary use only, since it is the intention of the trustees ultimately to introduce into the National Park specimens of all native plants of Victoria which are likely to thrive there, and more especially such as are specially interesting from a scientific standpoint, or which are in any danger of extinction in their native Victorian localities.

The successful introduction of a large number of new native plants would, of course, make a handbook based on the present lists of little value, but everything would naturally depend on the amount and success of the attempted additions to the Park flora.

PLANTS COLLECTED OCTOBER, 1910. NOT RECORDED IN PREVIOUS
LISTS FOR THE NATIONAL PARK, WILSON'S PROMONTORY.

<i>Acacia longifolia</i> , Willd., var. <i>floribunda</i>	Boat Harbour Hill
„ <i>longifolia</i> , Willd., var. <i>Sophoræ</i>	Five-Mile Beach
„ <i>salicina</i> , Lindl.	Collected by F. v. Mueller, 1853
<i>Acianthus exsertus</i> , R. Br.	Mt. Leonard
<i>Agrostis venusta</i> , Trin.	Near Mt. Oberon
<i>Brachycome scapiformis</i> , D. C.	Mt. Leonard
<i>Cardamine parviflora</i> , L.	Near Five-Mile Beach
<i>Centrolepis fascicularis</i> , Labill.	Near Vereker Range
* <i>Cerastium quaternellum</i> , Fenzl	Near Vereker Range
<i>Comesperma ericinum</i> , D. C. (white var.)	Near Waterloo Bay
<i>Cotula australis</i> , Hook f.	Near Vereker Range
„ <i>filifolia</i> , Thunb.	Side of Mt. Norgate
<i>Daviesia ulicina</i> , Sm., var. <i>ruscifolia</i>	Mt. Leonard
<i>Eodela verticillata</i> , F. v. M.	Near Five-Mile Beach
<i>Eucalyptus Gunnii</i> , Hook f., var. <i>acervula</i>	Near Vereker Range
„ <i>Sieberiana</i> , F. v. M.	Collected by F. v. Mueller, 1853
* <i>Fumaria officinalis</i> , L.	Near Darby River
<i>Glyceria fluitans</i> , R. Br.	Near Five-Mile Beach
* <i>Gnaphalium candidissimum</i> , Lam.	Near Mt. Oberon
<i>Gratiola peruviana</i> , L., var. <i>pumila</i>	Near Mt. Oberon
<i>Helichrysum rosmarinifolium</i> , Less.	Five-Mile Beach
<i>Hemarthria compressa</i> , R. Br.	Five-Mile Beach
<i>Hydrocotyle asiatica</i> , L.	Near Five-Mile Beach
„ <i>callicarpa</i> , Bunge	Mt. Leonard
„ <i>vulgaris</i> , L.	Near Five-Mile Beach
* <i>Lycium horridum</i> , Thunb.	Near Darby River
* <i>Mentha Pulegium</i> , L.	Near Vereker Range
<i>Mesembryanthemum australe</i> , Sol.	Side of Mt. Norgate
<i>Myriophyllum amphibium</i> , Lab.	Near Vereker Range
„ <i>elatinoides</i> , Gaud.	Near Five-Mile Beach
* <i>Nasturtium officinale</i> , R. Br.	Near Five-Mile Beach
<i>Platylobium obtusangulum</i> , Hook.	Mt. Vereker
<i>Polypodium grammitidis</i> , R. Br.	Mt. Vereker
<i>Potamogeton lucens</i> , L.	Near Five-Mile Beach
<i>Pterostylis parviflora</i> , R. Br.	Near Mt. Oberon
„ <i>pedunculata</i> , R. Br.	Mt. Leonard
„ <i>reflexa</i> , R. Br.	Mt. Leonard
„ <i>vittata</i> , Lindl.	Mt. Leonard
<i>Pultenæa canaliculata</i> , F. v. M.	Side of Mt. Norgate
<i>Scirpus inundatus</i> , Spreng.	Side of Mt. Norgate
<i>Sebæa albidiflora</i> , F. v. M.	Five-Mile Beach
<i>Selaginella Preissiana</i> , Spreng.	Near Vereker Range
* <i>Senecio elegans</i> , L.	Five-Mile Beach
<i>Spergularia rubra</i> , Cam.	Near Darby River
<i>Thelymitra longifolia</i> , R. and G. Forster	Mt. Leonard
* <i>Trifolium arvense</i> , L.	Near Darby River
<i>Viola hederacea</i> , Lab. (white var.)	Five-Mile Beach
<i>Woodwardia aspera</i> , Mett.	Mt. Vereker
<i>Xanthosia dissecta</i> , Hook f.	Near Mt. Oberon
<i>Xanthosia pilosa</i> , Rudge	Mt. Leonard.

The Victorian Naturalist.

VOL. XXVII.—No. 10. FEBRUARY 9, 1911.

No. 326.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 13th January, 1911.

Mr. J. A. Kershaw, F.E.S., one of the vice-presidents, occupied the chair, and about 45 members and visitors were present.

CORRESPONDENCE.

From Chief Inspector of Fisheries and Game, stating that the Minister of Agriculture had decided to adhere to his intention of altering the opening of the shooting season for Quail from 1st March to 15th February, and that this decision had only been arrived at after searching inquiry and mature consideration.

The Chairman stated that the Advisory Committee on the *Game Act* had protested against the alteration.

REPORTS.

A report of the excursion to Heidelberg on Saturday, 14th January, for pond life, was given by the leader, Mr. J. C. Kaufmann, LL.D., who reported an interesting and profitable afternoon.

ELECTION OF MEMBERS.

On a ballot being taken, Miss Georgina Sweet, D.Sc., Brunswick, and Mr. W. Gay, Surrey Hills, were duly elected as ordinary members of the Club.

PAPERS READ.

1. By Mr. J. A. Kershaw, F.E.S., entitled—"The Migration of Eels in Victoria."

The author related that he had recently had an opportunity of witnessing, at the Hopkins Falls, near Warrnambool, an "eel-fare" or the ascent of the young elvers up a stream from the sea, and at the falls had seen them ascending almost vertical wet rocks, though with some difficulty, and submitted specimens of the eels, and photographs showing the creatures in the act of wriggling up the rocks.

Messrs. Pitcher, Cole, Barnard, and Hardy congratulated the author on the successful results of his investigations, the latter complimenting him on the photographs, which were only obtained at the expenditure of much patience and risk.

2. By Mr. J. W. Audas, entitled—"Recent Botanical Investigations at Wilson's Promontory."

The author described the route taken by himself and Mr. P.

R. H. St. John during their recent visit to the National Park, Wilson's Promontory, on behalf of the National Herbarium, and made a number of interesting remarks on the habitats of the various plants found, a list of which was given in Professor Ewart's report in the January *Naturalist*.

EXHIBITS.

By Mr. F. G. A. Barnard.—Growing Victorian fern, *Polypodium serpens*.

By Mr. C. F. Cole.—Series of bird-skins from Mallee, Victoria, viz.:—Black-eared Cuckoo, *Mesocalius palliolatus*, Lath.; Gilbert's Thickhead, *Pachycephala gilberti*, Gld.; Scrub-Robin, *Drymacedus brunneiptygius*, Gld.; Lesser Brown Flycatcher, *Micræca assimilis*, Gld.; Striated Grass-Wren, *Amytis striata*, Gld.; Purple-backed Wren, *Malurus assimilis*, North; Black-backed Wren, *M. melanonotus*, Gld.; Mallee Emu-Wren, *Stipiturus mallee*, Camp. (new to science); Red-rumped Ground-Wren, *Hylacola cauta*, Gld.; White-fronted Honey-eater, *Glycyphila albigrons*, Gld.; and Striped Honey-eater, *Plectorhamphus lanceolatus*, Gld.

By Mrs. A. D. Hardy.—Young of Grass-Parrot, *Psephotus hæmatonotus*, three days old.

By Mr. A. D. Hardy, F.L.S.—Freshwater alga, *Bulbochate Brebissonii*, Kutz, collected at Willsmere, 1904 (new record for Australia); pollen grains of *Eucalyptus elæophora*, F. v. M., taken from collecting basket of common bee, *Apis mellifica*; pot-grown plant of *Lomatia longifolia*, collected at West Warburton as an inch-high seedling.

By Mr. J. A. Kershaw, F.E.S., for National Museum.—Elvers (young eels), from Hopkins Falls, near Warrnambool, and photographs in illustration of paper; Gippsland Emperor Moth, *Antheræa helena*, and living larvæ of same; small colony of ants, *Amblyopone*, sp., taken at Ferntree Gully by Mr. F. Spry.

By Mr. G. Lyell.—Dried specimens of orchid, *Caleya minor*, from Pyrete Ranges, near Gisborne, collected in January.

By Mr. D. J. Mahony, B.Sc.—Mineralogical specimens, including Selwynite, from Heathcote; olivine crystals, from scoria pits near Terang; barytes, from near Gellibrand River; chloropal, from Mt. William; corundum, from Mt. Wellington; and carbonate of bismuth (with quartz), from Bonang, all Victorian localities. Mica schist, with sapphires, from Mt. Painter, South Australia; auriferous quartz, from Bullfinch, Western Australia; and amblyonite, a fluophosphate of aluminum and lithium, from near Coolgardie, Western Australia (when found last year, first record for Australia).

By Mr. W. H. A. Roger.—Specimens of the "blue" butterfly, *Miletus delicia*, from chrysalides taken at Warburton on Christmas Day.

By Mr. J. Searle.—Specimens of the new Copepod, *Brunella ampulla*, described in January *Naturalist*, also rotifers, &c., mounted for microscope.

By Mr. F. Spry.—Beetle, *Onthopagus mnistyechi*, Harold, also ball of dung containing perfect insect; beetles associated with ants and termites, collected at Fern-tree Gully, October, 1910.

By Mr. P. R. H. St. John.—Dried specimens of *Humea elegans*, Smith, collected at Mueller River, East Gippsland, from plants over twenty feet high; fern, *Gleichenia dichotoma*, Hooker; and *Rubus moluccanus*, L., from Newton's Creek, near Cabbage-tree Creek, East Gippsland.

After the usual conversazione the meeting terminated.

EXCURSION TO KEW.

KEW was placed on the excursion list for the current year with the view of devoting an afternoon to the determination of the several kinds of eucalypts and larger growing shrubs to be found in certain parts of that interesting suburb. On meeting at the Junction at the appointed time on Saturday, 26th November, it was decided to first of all visit Studley Park, then proceed through the Yarra Bend grounds to the Kew Asylum reserve, making, in all, a ramble of rather more than three and a half miles. The day was a pleasant one, and the small party of members present were charmed with the variety of the scenery met with during our walk. Some remarks on the situation of the park, and its geological features, may be helpful in following the report of the outing. Studley Park is situated on the generally eastern side of the River Yarra, which in this portion of its course is very sinuous, and is Silurian country, with small alluvial flats in places and with gravel caps to the spurs. Some of the spurs end in steep rocky declivities at the river edge. Alternating with the spurs are small valleys, some of them well wooded. These several features bear distinctive vegetation, which affords excellent harbour for numerous species of birds.

The park may be approached from the city by two main routes—by the Carlton and Abbotsford tram line to Johnston-street Bridge, by which entrance two excursions have recently reached the western portion of the park; or by the Victoria-street tram line to the Walmer-street footbridge, at its south-eastern corner; or continuing the journey by the Kew horse-tram, it may be approached *via* Studley Park-road from the Junction at Kew (which, by the way, is also close to Kew railway station), the route taken on the present occasion. It is probable that no other reserve has the

same amount of water frontage in proportion to area. Thus, the 200 acres of park land here is skirted by about four miles of deep river. The area is separated by roads into three portions. The southern portion, between Walmer-street and Studley Park-road, contains the recently formed trout hatcheries; the central area, in the angle formed by Johnston-street Bridge-road and Studley Park-road, contains the Dight's Falls pumping station reservoir; while the largest, northern part lies between the last-named road and the river, opposite the Yarra Bend Asylum, and has at its western extremity the Dight's Falls pumping station, while an old aborigines' look-out and camp, where still "skinning flakes" of quartzite and flint may be picked up as the bluff weathers, is situated not far from the Falls. Excepting one short line, the most eastern boundary of the northern area, the park is enclosed by road and river.

The northern area offers the best field to the nature student, and to this we gave attention. The greater part is well wooded with several species of *Eucalyptus*, none very tall; but there are also groves of *Acacia pycnantha*, a less quantity of *Acacia decurrens*, var. *mollis*, and fine specimens of the "Prickly Box," *Bursaria spinosa*, which, in flowering season, is a good "collecting-ground" for the entomologist. A few trees of the "Lightwood," *Acacia implexa*, were noted, as well as small specimens of the Blackwood, *A. melanoxylon*, two species which are often confused. The eucalypts are approximately distributed in zones, as follows:—The Red Gums, *E. rostrata*, as naturally would be expected, are found on the river banks and flats or gentle slopes near the river. Some of those which once grew at the water's edge had their roots drowned, owing to the bases of their stems being submerged by a permanent rise of water when the height of the Dight's Falls weir was increased some years ago, and the dead trees are now whitened skeletons, not without value in the picturesqueness of the neighbourhood. Some of the Red Gums have boles so smooth and white that many frequenters of the river call them White Gums. The next species of moisture-loving character is the Manna Gum, *E. viminalis*, in some parts called White Gum and "Ribbon Gum." This species grows well near the waterside, but ascends the small valleys to near the crest of the ridges, meeting on the way the Yellow Box, *E. melliodora*, and the rosette-umbelled variety (*acervula*) of the Swamp Gum, *E. gunnii*; while in more exposed places, and occupying more particularly the open, hungry-looking spur-tops, is the "Smooth Ironbark," *E. leucoxylon*, in large patches. Others are less frequent, and near the roadside, in a fenced-off plantation, three introduced species may be seen—viz., *E. botryoides*, *E. globulus*, and *E. corynocalyx*. Of these,

the first-named gives best results, the large, broad leaves giving a good shade. *E. viminalis* and *E. melliodora* may be seen in various stages of decortication, irrespective of aspect, soil, or season, and these species, and sometimes *E. gunnii*, var. *acervula*, may be indifferently placed in the sections of the cortical system *Leiophloia* or *Hemiphloia*, but would sometimes be placed without doubt in one or the other. Students of the native flora may find along the river bank only traces of the once abundant Silver Wattle, *A. dealbata*, the principal shrubs being now *Callistemon salignus*, *Melaleuca ericifolia*, *Leptospermum flavescens*, *Pomaderris apetala*, *Kunzea peduncularis*, *Coprosma Billardieri*, and occasionally *Hymenanthera Banksii*, the "Tree Violet." On the declivities which end the spurs a fair shrubbery exists, comprising stunted eucalypts, *Myoporum viscosum*, *Casuarina quadrivalvis* (syn. *C. stricta*), *Exocarpus cupressiformis*, *E. spartea*, *Acacia pycnantha*, &c. The twining parasite *Cassytha melantha* and *Clematis microphylla* link together shrubs of different species. A few plants of the introduced and now outlawed gorse, *Ulex Europæa*, are held in subjection by the *Cassytha*. Horses graze in the park, and probably keep down many small shrubs and herbs, for of the large number recorded in the *Naturalist* in 1885 (vol. i., p. 172 *et seq.*) by Mr. F. Reader in a partial flora of the park, and with notes in systematic order on their economy and etymology, very many are now absent or difficult to find. At that time Mr. Reader estimated the flora of the park at 271 species, of which 67 had been introduced, thus leaving 204 species, representative of 58 natural orders. For other notes on the historical and geographical aspects of the park, those interested might read Mr. F. G. A. Barnard's recently issued "History of Kew."

Having exhausted the northern section of the park, we crossed in the ferry boat to the Yarra Bend side of the river, and made our way towards the old tramway bridge (now a footbridge), forming a connection with the Kew Asylum grounds. Nothing of interest was seen on our way across the level basaltic plain, but as soon as the river was crossed the wooded Silurian slopes on the Kew side afforded many objects of interest in the way of plants and birds. A visit was paid to the little enclosure, kindly fenced in at the request of the Club by the Asylum authorities some years ago, in order to protect a small, isolated patch of *Styphelia strigosa*, which, Mr. Barnard had pointed out, was the only occurrence of the species nearer than South Morang, on the Plenty. It was found to be doing well since the cattle had been prevented from browsing on it, and quite a number of other plants were reaping the benefit of the protecting fence, though it is of a very simple character.

In addition to some of the shrubs already mentioned, Mr. St. John noted the following species among the smaller plants as being in bloom:—*Asperula oligantha*, *Brunonia australis*, *Convolvulus erubescens*, *Cygnoglossum suaveolens*, *Arthropodium strictum*, *Echinopogon strictus*, *Goodenia ovata*, *Hypericum japonicum*, *Helipterum dimorpholepis*, *Kennedyia prostrata*, *Lagenophora Billardieri*, *Leptorrhynchos squamatus*, *Poranthera microphylla*, *Pimelea curviflora*, *P. humilis*, *Vittadinia australis*, and *Viola hederacea*. To the same observer I am indebted for the names of the birds seen during the afternoon—viz., Reed-Warbler, *Acrocephalus australis*; Masked Wood-Swallow, *Artamus personatus*; White-browed Wood-Swallow, *A. superciliosus*; Wood-Swallow, *A. tenebrosus*; Sacred Kingfisher, *Halcyon sanctus*; Black-faced Cuckoo-Shrike, *Coracina robusta*; Mud-Lark, *Grallina picata*; Rufous-breasted Thickhead, *Pachycephala rufiventris*; White-plumed Honey-eater, *Ptilotis penicillata*; and Black Fantail Flycatcher, *Rhipidura tricolor*.

It is proposed to repeat next season the aquatic excursion of last year, for by means of boats only can the variety of hill and dale, of flat woodland and shrubby cliff, be seen in one afternoon.—A. D. HARDY.

EXCURSION TO HEIDELBERG.

THIS excursion took place on Saturday, 11th January, when a small party of seven assembled at Heidelberg to investigate the ponds. The small, dark pond near the river is a favourite resort, but is difficult of access, the land being jealously guarded by private owners. It is reported that on one occasion the owner, with a loaded gun, stopped a University professor and a number of leading scientists, and forced them to beat a hasty retreat. Profiting by experience, and through the courtesy of Mr. Shephard, we were enabled to pay a friendly visit to the owner and obtain his permission to visit the pond, under a promise not to stray. We visited three waterholes, all of which were teeming with life. In the dark pond every dip gave numerous clusters of *Conochilus dossuarius*, and from a fallen tree, projecting some distance into the water, some fine patches of fresh-water sponge with statoblasts were collected. Returning, a muddy waterhole was examined, and from the weeds fringing the margin numerous colonies of *Megalotrocha albo-flavicans* were obtained, and a sweep of the net showed *Daphnia carinata* largely developed, and numerous other forms of Entomostraca with larvæ. Water Mites, *Pterodina patina*, several forms of beetles, diatoms, and desmids. We then tried the lagoon near the bridge, and there obtained

Melicerta ringens and *Limnias ceratophylli*, *Volvox globator*, and *Rotifer vulgaris*. Other rotifers collected, which have been identified by Mr. J. Shephard, were *Lacinularia elliptica*, *L. socialis*, *Floscularia ornata*, *Salpina brevispina*, *Dinocharis tetractis*, *Philodina citrina*, *Euchlanis*, sp., and *Monostyla*, sp. The day was genial, and altogether a very pleasant and highly satisfactory afternoon was spent.—J. C. KAUFMANN.

NOTE ON THE HABITAT OF GRANT'S BIRD OF PARADISE (*Paradisea granti*, North).—In describing *Paradisea granti* in the *Victorian Naturalist* (vol. xxii., p. 156, January, 1906) some years ago, nothing was known as to where the specimen was procured, but I surmised that it was in some part of German New Guinea. Since the species was described, from time to time many specimens have been brought to Sydney, but all efforts failed to elicit any information as to the part of New Guinea from which they were obtained. Last year the Trustees of the Australian Museum purchased several species of Birds of Paradise from Mr. Charles Richart, who collected them in different parts of German New Guinea. Among them were three beautiful specimens of *Paradisea granti*, and I embraced the opportunity of obtaining the required information of the habitat of this species. Mr. Richart told me that he found *Paradisea granti* at Kuri Kuri, 90 miles south of Frederick Wilhelmshafen, and at Bokowa and Samo Harbour, Huon Gulf, 230 and 245 miles respectively south of the same locality. The birds were all procured in the dense jungle, and this species was not found farther inland than 50 miles from the coast. Notwithstanding that one has to pay a licence to shoot, and there is an export duty on all bird-skins sent out of German New Guinea, Mr. Robert Grant, Taxidermist of the Australian Museum, after whom this species is named, informed me that during last year he saw over thirty specimens of Birds of Paradise, consisting of about an equal number each of *Paradisea finschi* and *P. granti*, transformed into hat ornaments or other adornments for the fair sex.—ALFRED J. NORTH. Australian Museum, Sydney, January, 1911.

ANTS AND THEIR WAYS.—A careful study has recently been made at the Dresden (Germany) Forestry School of the habits of a certain species of ant, which is both a leaf-cutter and a seed-gatherer. It was found that most of the seeds, especially those of leguminous plants, were allowed to germinate before the ants put them out to dry, evidently to allow the seed-coat to burst; but the germination was not allowed to go far enough to ferment the starch into sugar. When the seeds were dry and dead the ants took them back into the nest, chewed them into a dough, which was then baked in the sun in the form of minute biscuits, these being stored in the nest for future use!—*English Mechanic*, 9th September, 1910.

A SHORT RAMBLE ALONG THE LERDERDERG.

BY J. G. O'DONOGHUE AND P. R. H. ST. JOHN.

(Read before the Field Naturalists' Club of Victoria, 11th Dec., 1910.)

A GLANCE at a map of the county of Bourke will show that the Lerderderg rises in the ranges to the north-west of Mount Blackwood, and flows in a more or less south-easterly direction to mingle its waters with those of the Werribee a short distance below the township of Bacchus Marsh.

Traversing as it does a large area of Palæozoic country, it invariably presents a turbid appearance, and this turbidity is even more accentuated when the stream is viewed from one of the many precipitous and timbered ranges by which its course, for the greater part, is margined.

Though not possessed of such striking and picturesque features as are to be seen along the Werribee in the neighbourhood of the well-known Gorge, the Lerderderg is not altogether destitute of that scenic beauty which appeals to the average sight-seer, and, at that point where it issues from the hills, presents many pleasing views capable of leaving more than a lingering impression on the mind. Many natural features interesting to the geologist abound, and many kinds of vegetation exist which prove as engaging to the botanist as the birds that frequent the coverts along the stream are to the ornithologist.

Though both of us had visited the locality before, the recollection of the pleasure then derived induced a further visit to somewhat familiar scenes—this time in company.

A narration of the trip, though it was of necessity a brief one, barely extending over eight hours, may prove of interest to those who, though they may be familiar with the Werribee Gorge and its environs, have yet to make the acquaintance of the Lerderderg and its encompassing hills.

Leaving Spencer-street at 8.20 a.m. on Saturday, 1st October, behind a "double-header," we were soon out on the plains, where repeated instances of the spread of introduced weeds were brought to our view in quick succession.

At the Kororoit Creek the common Artichoke (*Cynaria cardunculus*) is rapidly extending its domain on either bank in what one would assume to be uncongenial surroundings. In the cultivated and fallowed areas beside the railway line near Rockbank, *Erechtites quadridentata* and the agriculturist are at variance. The weed would appear to be irrepressible, for many acres of arable land may now be discerned where Hodge has retired from the contest defeated. A species of charlock, possibly *Brassica sinapistrum*, is also much in evidence among the crops, and bids fair to become as great a pest as the composite

just mentioned. Another weed, and one that is spreading despite the interdiction under which it labours, is the wild Clary (*Salvia verbenacea*). Sturdy specimens, in full bloom, could be culled on the Rockbank railway platform on 1st October.

In the railway reserve the native and exotic plants, protected alike from depasturing cattle and the agriculturist, grow profusely. Of the former, *Craspedia richia*, *Erodium cygnorum*, *Pimelea glauca*, *Brachycome cardiocarpa*, *Wahlenbergia gracilis*, *Stackhousia linarifolia*, and *Helichrysum apiculatum* were the most frequently noted. *Leptorrhynchus squamatus*, *Ptilotus macrocephalus*, and *Pimelea curviflora* were occasionally seen, and at longer intervals *Chamæscilla corymbosa* and the orchid *Diurus pedunculata*. Of the introduced plants, *Silene gallica*, *Briza maxima*, *Phalaris canariensis*, *Tunica prolifera*, and *Cryptostemma calendulaceum* were the most conspicuous. Within view of the line the eucalypts *E. melliodora* and *E. rostrata* were flowering freely, and large numbers of Rosella Parrots and an occasional Spiny-cheeked Honey-eater were observed flying from tree to tree.

Bacchus Marsh was reached about twenty minutes behind scheduled time. Passing through Maddingley Park, where not one of the magnificent native flowering shrubs that were met with a few hours later finds what should prove a congenial home, we crossed the Werribee, and continued up the main street of the township, noting on the way several splendid specimens of the Blue Gum, *Eucalyptus globulus*, and a fine avenue of Elms, *Ulmus montana*, then rapidly putting on a livery of tender green.

The township of Bacchus Marsh is situated in a large, irregular depression, surrounded by bare hills, of rounded contour and of no great elevation. In bygone ages the depression is believed to have constituted the basin of an extensive lake, when the glacial beds of the district were deposited. A comparatively narrow but well-defined lava flow may be noted occupying the high ground between the valleys of the Pyrete and Goodman's Creeks, which empty into the Lerderderg from the east. This lava, issuing from the ancient crater of Mount Bullengarook, which stands boldly up to the north, filled up the bed of the ancient river that flowed into the lake. Local tradition states that the site of the township was formerly an extensive swamp, and was settled upon and reclaimed by Captain W. H. Bacchus in the early forties.

About a quarter of an hour's walk sufficed to take us to the outskirts of the township. On our left was a crop, in which the introduced *Fumaria officinalis* was unusually prominent; whilst to our right a dense and robust growth of the Yellow Box,

Eucalyptus melliodora, seemed set in a golden carpet of Cape-weed. Along the roadway *Leptorrhynchus squamatus*, *Cotula coronopifolia*, and *Goodenia pinnatifida* were the most prominent plants. Hereabouts the works of the Darley Fire Brick Co. are situated, and the white pipe-clay beds exposed in the large excavation on the hillside form a conspicuous feature in the landscape.

Determining to proceed up the right bank of the stream, we quitted the roadway and entered a paddock in which *Cryptostemma calendulaceum*, *Erodium cygnorum*, and *Hordeum murinum* formed a luxuriant carpet. The ground was comparatively level, though with a slight fall riverwards, and evidently had formed portion of an ancient flood plain. The rank growth of Cape-weed, Crane's-bill, and Barley-grass concealed pebbles of various sorts and sizes, against which our toes repeatedly struck, rendering rapid progress a difficult matter. It was noted that only the immature trees of *Eucalyptus melliodora* met with hereabouts bore inflorescence. At a point where the river impinges against a steep cliff *Zygophyllum Billardieri*, and *Enchylæna tomentosa* were met with. Up to this point the principal birds seen were the Black-and-White Fantail, Brown Flycatcher, Chat, Pipit, Magpie, Blue Wren, Laughing Jackass, Crow, and Pallid Cuckoo.

The river flat on the right bank of the stream hereabouts is narrow, and for the most part occupied by lucerne paddocks. On the uncultivated portion *Plantago lanceolata* and *Lolium perenne* abound, and extend some distance up the sparsely-timbered slopes of the hills. Along the margin of the stream *Eucalyptus globulus* flourished, and displayed foliage of uncommon size; and on the drift sand-beds, between the gums, the flowering tree-violet, *Hymenanthera Banksii*, grew profusely. Beneath its ample covert the ubiquitous "bunny" frisked and sat, and on our near approach vanished into some subterranean retreat.

On the left bank of the stream at this spot fine sections of glacial till are exposed to view, formed, for the most part, of tough, unstratified clay, interspersed with stones and boulders.

Passing beneath the drooping branches of several large trees of *Acacia decurrens*, var. *mollis*, we reached the shingly bed of the stream, and had proceeded some little distance along its course when the spectacle afforded by a luxuriant specimen of *Clematis microphylla* caused us to pause. Surrounding the small "home acre" of a humble domicile, to avoid which we had descended from the grassy flat to the river bed, was a wire fence, composed of two barbed wires, with the necessary posts. At a particular spot in the fence the clematis had climbed a post, and, extending itself along the wires, hung down in a veritable blanket of inflorescence.

We had just begun to move off, when a man's voice from the

bank above us called out—"It's better walking up here; come up." Ascending a series of rude steps cut in the steep bank of Silurian rock, we reached the spot where the man stood. He was in appearance and manner one of Nature's own, and his surroundings were in harmony. Surrounding his rude dwelling were numerous flowering growths of *Cassinia aculeata*, *Acacia montana*, *Myoporum viscosum*, and *Dianella revoluta*. Matted tufts of *Clematis microphylla* and *Cassytha melantha* sprawled in bewildering confusion over these, and here and there *Glycine clandestina* displayed its humble flowers from some *Dodonæa viscosa*. Amid these growths various breeds of fowls foraged or wandered into the garden to vary their diet by sampling the foliage of the vegetables. After prescribing, to his evident satisfaction, for a crushed hand, we thought it a favourable opportunity of promoting the labours of the Plant Names Committee by the acquisition of some information relative to the local vernaculars of the plants by which we were surrounded. The *Cassinia* was designated "Dogwood," and the *Cassytha* "Supple-jack." The *Clematis* was termed "Mata," and the *Glycine* "Sarsaparilla." The *Dianella* was called "Cut-grass," and the *Myoporum* some name which both of us failed to understand. To the average field naturalist the information supplied would have more than sufficed; but one of the party, being possessed of an abnormal capacity for knowledge, still hankered for more. Indicating by an inclination of the head a flowering *Acacia montana*, he queried, with well-simulated simplicity, if it was not an acacia. The old man laughed uproariously. "You towney blokes do mix things up," he said—"why, that's not an acacia! that's myrtle scrub!" He was soon otherwise apprised, and submitted to the correction with that resignation of feeling that one manifests when he surrenders his jaw to the ministrations of a dentist.

In reply to a question respecting the auriferous properties of the river-wash hereabouts, the old man became much excited respecting the discovery in his sluice-box of a piece of metal the identity of which was a mystery to all in the neighbourhood. The discovery of the reef whence the metal was shed was confidently spoken of, and the wealth consequent thereon vaguely hinted at. Expressing a desire to view the metal, we were shown several pieces of iron pyrites. The belief, possibly, of many months was summarily shattered by a few words. The old man was for a few moments dumbfounded. On recovering his equanimity he, in a sudden burst of generosity, offered us a ruby slightly larger than a grain of wheat. This generous offer was declined, on the plea that we already had a varied assortment of gems at home; but, in reality, neither of us wished to be burdened with even a small quartz crystal.

Parting from the old man, we proceeded along the course of a water race that had been excavated in the vertical Silurian strata. *Dodonæas*, heavily burdened with seed-vessels, and luxuriant specimens of *Rhagodia Billardieri* abounded. Here and there *Celsia cretica*—an introduced species of the Scrophularinæ—grew among the rocks, and, in sheltered places, the ferns *Grammitis rutifolia* and *Cheilanthes tenuifolia*. The comparatively narrow flat margining the river's tortuous course was overgrown by sturdy specimens of *Hymenanthera Banksii*, and these, in turn, by *Clematis microphylla*. Amid the covert afforded by these growths the New Holland Honey-eater was to be discerned in scores. Blue Wrens and White-shafted Fantails were also in evidence, attracted thither possibly by the insects disturbed from the *Hymenanthera* by the honey-eaters.

The Silurian formation was soon succeeded by the glacial beds of the district. These formed abrupt cliffs of greater or less height. Along the crest *Indigofera Australis*, *Dianella revoluta*, and the acacias *A. pycnantha*, *A. montana*, and *A. acinacea* were often noted. At the base of the cliffs, occupying more congenial soil, *Myoporum viscosum* and *M. deserti* flourished; in company grew the Wild Tobacco, *Nicotiana suaveolens*, and the Kangaroo Apple, *Solanum aviculare*, all being in full bloom, the flowers of the latter being besieged by numerous butterflies.

In the sandy loam capping the glacial conglomerate the freshly excavated tunnels of the Orange-tipped Pardalote were noted. The birds were often seen, and their calls were as monotonous as the rush of the river on our right. Hereabouts a Blackbird was flushed from a Bottle-brush, *Callistemon salignus*. The bird, as a rule, does not range so far from the haunts of men. Here, too, a splendid specimen of the Blue Gum, *Eucalyptus globulus*, was met with, bearing carpels altogether different from the typical form. One of us, who has probably the largest and most varied collection of *Eucalyptus* carpels in the State, has nothing among his specimens of *Eucalyptus globulus*, collected in various parts of Victoria, that compare with those gathered from this particular tree. The Woolly Tea-tree, *Leptospermum lanigerum*, was occasionally seen, and the Mistletoe, *Loranthus pendulus*, proved to be more than usually abundant. About mid-day we paused for lunch beneath a large tree of *Acacia montana*—a glorious sight with its golden-yellow blooms. Near by the ruins of an old hut the introduced *Iris sub-biflora* flourished and displayed its blooms unravished by any wanton hands. The sward on which we rested comprised *Stellaria pungens*, *Hydrocotyle hirta*, *Ajuga Australis*, *Cymbonotus Lawsonianus*, and *Myosotis*

Australis. Several large Blue Gums overshadowed all, and in these the White-throated Honey-eaters foraged silently, the only indication of their presence being the occasional fall of a damaged blossom.

After lunch we continued our journey, and soon reached the part, some eight miles from Bacchus Marsh, where the stream debouches from the hills. On the slopes margining the river hereabouts grow a variety of eucalypts. We noted *E. polyanthema*, *E. hemiphloia*, *E. elæophora*, *E. melliodora*, *E. viminalis*, *E. globulus*, and *E. leucoxylon*, and from the depths of these came the pleasant calls of the Bronze and Pallid Cuckoos. The Rosehill and Crimson Parrakeets were numerous, and, answering our calls, came flying through the scrub in quest of the noisy strangers who had invaded their domain. So, too, the Blue Wren, perched on the spray of a *Dodonæa*, uttered loud challenges to the unseen long-tailed trespassers on his preserves.

In the neighbourhood was another old hut, surrounded by numerous bee-hives. The bees were evidently things of the past, for few were seen flying in the warm sunshine about their citadels. On a previous visit Mr. St. John had noted a flock of Bee-eaters, *Merops ornatus*, comprising over one hundred individuals, levying heavy toll on the industrious insects here. The occupant of the hut, a miner by occupation, came out for a chat, and, after being presented with that day's *Argus*, showed us through numerous tunnels driven in glacial drift, in which "gossan floors," "cut offs," "dips," "rises," "faults," "down-throws," and genuine "duffers" were pointed out in all sorts of unlikely places, and the why and wherefore of the presence of gold in the drift revealed to us. In turn we pointed across the river to a fine section of the glacial beds abutting the vertical Silurian strata, and briefly outlined the theory of the deposition of the beds. Though listened to with marked respect, it needed no keen perception to detect that the theory was considered fallacious by the miner, though he admitted that "them geologist blokes did know something about the district," since he had quarried stone for the Shire Council, in which the outlines of ferns and plants with laurel-like leaves, to which we had referred, had occurred.

Bidding our brief acquaintance adieu, we descended a steep gully at the rear of his hut, and gained the river's margin, finding on the way several large mammalated pieces of carbonate of lime on the tip of a small drive. Now for the first time the looked-for shrubby labiate, *Westringia glabra*, was discerned, each bush presenting a gorgeous display of pale violet bloom. In juxtaposition *Goodenia ovata* and *Pultenæa daphnoides* flaunted their beauty. Making our way across the uptilted edges of the

Silurian beds, we followed the course of the river for some considerable distance before we determined to ascend to the crest of the range to the south-west. Close to the water's edge, *Westringia glabra*, *Goodenia ovata*, *Pultenæa daphnoides*, *Callistemon salignus*, and *Pomaderris racemosa* were the most common. Some years ago the beautiful *Prostanthera rotundifolia* and *Indigofera Australis* grew profusely hereabouts. Careful search failed to reveal a single specimen of the Mint Bush, and but a few isolated growths of the latter.

On breasting the slope we found it more or less barren as regards herbage. A few tufts of Wallaby Grass, *Danthonia penicillata*, occurred, with numerous specimens of *Senecio lautus*, *Tillæa verticillata* and the succulent *Calandriana* (*Claytonia*) *calyphrata*. Higher up *Veronica perfoliata*, *Dianella revoluta*, the acacias *A. pycnantha* and *A. acinacea*, *Marianthus procumbens*, *Cassinia aculeata*, and the orchid *Caladenia carnea*, were in evidence.

Resting on the hill-side, and glancing across the V-shaped valley, the precipitous ranges rose in rounded outline, hill behind hill, clothed from base to apex with various species of eucalypts. Here and there amid the sombre green investiture blotches of yellow proclaimed the presence of *Acacia acinacea* or *Pultenæa daphnoides*. Still higher up, *Pseudanthus ovalifolius* was met with, and the numerous weathered specimens abounding proved that the locality was not a congenial one. This Euphorbiaceous plant has a limited range, and, therefore, is seldom collected. Plants of both sexes were found in a limited area, the pistillate plant being distinguished from the staminate by its larger leaves. The various species of *Eucalyptus* dwarfed as the elevation increased, and when the crest was gained few were more than shoulder high, and of no great diameter, but indisputable evidence was available to attest the fact that in former years trees of large dimensions had existed at this spot. Whether the present infertility of the crest on which they grew is due to elevatory influence, to aridity induced by the river cutting deeper into the valley, or to less congenial climatic conditions, we leave others to decide. Gazing south, the meandering course of the Lerderderg lay exposed to view, reach after reach of turbid water showing in a shingly setting. The confining banks were margined in places by vegetation, but for the most part by grassy flats of greater or less extent, gradually merging into swelling sparsely timbered uplands, on which numerous cattle depastured. The flats and uplands, as far as definite vision could range, were yellow with the flowers of the Cape-weed. Mount Cotterell, near Rockbank, lay east by south, while far away to the east the Dandenong Ranges showed hazy and indefinite. The gentle

breeze so modified the noise of the rushing river that the far-off barking of a dog, the liquid call of the Harmonious Thrush, the plaintive cries of the Bronze and Pallid Cuckoos and White-eared Honey-eaters, came in pleasing sequence to the ear. Striking south-easterly along the crest, we soon reached a locality where the Silurian rock was less metamorphosed, and, consequently, more congenial to vegetation. The eucalypts soon increased in bulk and variety, *E. elæophora* being noted for the first time. In the neighbourhood of where portion of a quartz reef, about 3 feet in thickness, had been exposed by some energetic placer-seeker, grew *Daviesia latifolia*, *D. corymbosa*, *Craspedia Richea*, the orchids *Caladenia carnea* and *Diurus maculata*, *Myosotis Australis*, *Pelargonium Rodneyanum*, *P. Australis*, *Geranium dissectum*, and other plants.

An interesting and unique discovery was made hereabouts—namely, a variegated form of the epacrid *Brachyloma daphnoides*, which we believe has not hitherto been recorded. Whilst examining the growth a pair of Black Wallabies were startled from beneath a bush of *Dillwynia ericifolia*. They started off at a headlong pace, one along the crest of the spur and the other down its slope, stopping occasionally to glance back at the unusual intruders in these solitudes. The slopes here were bright with *Pultenæa daphnoides*, *Acacia acinacea*, and the two forms of *Daviesia* previously mentioned. Whilst moving about among the timber to command a view of Mount Blackwood, the Spotted Ground-bird and the Brush Bronze-wing Pigeon were flushed.

Descending a precipitous watercourse, we found the enviroing slopes green with the Granite Fern, *Gheilanthes tenuifolia*, and in less precipitous spots *Hydrocotyle hirta*, *Cryptostylis reniformis*, and *Stuartiana Muelleri*. *Cassinia aculeata* abounded, and one specimen of the Native Musk-tree, *Olearia (Aster) argophylla*, was noted. Near the junction of the watercourse with the river the Black-and-White Fantail, White-throated Tree-creeper, Brown Flycatcher, and White-browed Babbler were numerous. Large patches of *Stackhousia linariifolia* were noted hereabouts, on which the Native Bee, *Trigona carbonaria*, occurred in large numbers; and on the bare earth, at the base of several of the gums, large bunches of the larvæ of the Gum Saw-fly, *Perga dorsalis* (?), were observed.

Having now struck our route on the outward journey, our investigations practically terminated; so, with but a limited time at our disposal to catch the train, we set a direct course for Bacchus Marsh, feeling loth to leave a locality which, if it were more accessible, would prove an interesting one for a Club excursion. As it is, only comparatively good walkers should attempt to explore the district.

MIGRATION OF EELS IN VICTORIA.

BY J. A. KERSHAW, F.E.S., Curator of Zoology, National Museum.

THE reproduction and method of dispersal of the common fresh-water eel, which has been involved in mystery for so many years, and proved such a puzzle to scientists, has excited considerable interest and discussion in this State during the last few years.

The fact that the question of the breeding and development of the European eel has been satisfactorily cleared up, comparatively recently, has revived the interest attached to the Australian species.

To Dr. T. S. Hall, M.A., is mainly due the credit of opening up the question regarding the species inhabiting our own country, and his inquiries, chiefly through the press, have been instrumental in bringing forward many interesting facts relating to their migration.

Owing to the fact that eels captured in fresh waters could never be found carrying spawn, various conjectures have been made regarding their method of breeding. It has been asserted that they breed in mud, or are generated from the skins of snakes or old eels, from slime, or from horsehairs. The latter statement, as has previously been pointed out, is probably due to the fact that certain long, smooth, thin, aquatic worms, known as "*Gordius* worms," have been commonly found in the same waters.

A few years ago a piece of horsehair was sent to the Museum, carefully preserved in spirits, as "a peculiar worm taken from a water service pipe." In another case a *Gordius* worm and a horsehair, enclosed in a bottle, were sent, under the belief that they were two worms intertwined.

There is now every reason to believe that the migration and breeding of the Australian eels is similar to that of the European species—namely, that they migrate to the sea for the purpose of propagation when five or six years old; that the males precede the females; and the old ones never return to fresh waters, but die soon after the breeding season.

The eggs are deposited in deep water and float in the sea. The larvæ are rarely found on the surface, and do not resemble the adult, but were thought to be a distinct species, and described under the distinctive name of *Leptocephalus brevirostris*. The young eels, or "elvers," as they are more commonly called, are believed to be one year old when they ascend the rivers. That they ascend the rivers here in a similar manner to those in England and Europe is undoubted; but, although the fact has been repeatedly proclaimed, there are many who stubbornly refuse to be convinced.

The fact that eels are to be found in more or less isolated waters, far removed from, and not connected by any water-course with, the sea is considered conclusive evidence that the eels must breed in fresh waters.

In earlier investigations it has been pointed out that some individuals, unable, from some insurmountable cause, to leave their environment, apparently spend their whole life in fresh waters, but they are barren. It is recorded that a specimen was kept in confinement in the family of the French naturalist Desmarest for upwards of 40 years, growing to a length of $4\frac{1}{2}$ feet.

Many of the keener observers have been much puzzled by the fact that, although they have examined eels at different times of the year, they have never succeeded in finding one carrying spawn, and some have, therefore, concluded that eels, like some of our snakes, are viviparous. The discovery of internal parasites in the eel has aided this belief.

The fact is that the generative organs do not develop in fresh water, but only in salt water.

According to Professor Seeley, the immature eggs are only one-tenth of a millimetre in diameter, and therefore microscopic.

The males are to be distinguished from the females by the sharper form of the snout and their smaller size, rarely exceeding 15 inches in length. According to some authorities, they are only found in brackish water and in the sea, and always precede the females in their migration to the sea.

In a paper read before this Club in July, 1905, Dr. T. S. Hall contributed some interesting notes on the distribution and means of dispersal of the fresh-water eel in this country. Some further facts on the subject which have come to light may be recorded.

In the "Nature Notes" column of the *Argus* of 21/7/05, Mr. J. A. McWilliam, Geelong, says:—"Nearly all the dams and lakes within miles of the Hopkins and Emu Creek are full of eels, and some of them have no defined watercourse to them; but if they overflow strongly in the early spring the eels will find their way over the grass to them. I have found eels three or four miles from permanent water, travelling over the grass with only 2 inches or 3 inches of water. Lake Terang has eels in it (or had a few years ago), and it has not run out since 1838 or 1839. . . . I fished the Emu Creek for years, and never caught a really small one like those you get in the Barwon, near the salt water—hundreds of them like sand-worms."

In the same column for 25/10/07, Mr. C. W. Harrison, of Ballarat, says:—"Some years ago, when Lake Burrumbeet overflowed in the spring, several tons of eels escaped at the outlet into Emu Creek, and from there, I suppose, to the sea."

A few months after I saw an eel-fare—the young ones making their way back again. They were from 3 to 4 inches in length, and about the thickness of a lead pencil. It was amusing to watch them working their way up a small fall through the water, and at intervals clinging to the rocks.”

Again, on 12th May, 1905, Mr. J. R. Henty, of Pakenham, says:—“Every dam or waterhole about this district contains eels. Wherever sunk, the eels seem to find them out in a short time. Clearing out a hole last week, the men got 24 large and about 50 small ones. The general impression about here is that the eels travel across country on dewy nights, when the grass is very wet. . . . Some years ago, when driving one clear, dewy night, I came across an eel on the road. It was some distance from water, very lively, and evidently was travelling. I had a personal experience of eels travelling overland in the same district about three years ago. A man employed on the farm where I was staying reported having just killed a snake in the paddock. It was a bright moonlight night, following a very showery day. On going to the paddock to examine the supposed snake, I found the very much battered remains of an eel about 18 inches long. It had evidently left a small creek running through the paddock, and was travelling uphill in the direction of a dam in an adjoining paddock.”

Mr. James H. Young, of Meredith, writing on 26th August, 1908, states that the young eels appear in great numbers at the falls on the Moorabool River. He says:—“We often go there (to the falls) to view the migration of the young eels, which takes place about January. They have to climb up about 8 feet of rock to get from the pool at the foot to the one above, and when I say that the water in the bottom pool is a seething mass of young eels I do not exaggerate.”

On 19th November, 1909, Mr. James Evans, of Cudgee, near Warrnambool, wrote stating that the “elvers” were in great numbers in the Hopkins River. In response to my request to send to the Museum as many as possible alive, I received a couple of hundred specimens, ranging from about 4 to 10 inches in length. Very shortly afterwards Mr. J. A. Leach happened to be in the same locality, and kindly sent me a few more, together with half a dozen lampreys. All these specimens were kept alive for some time, and a number exhibited in the museum, where they excited considerable interest among the visitors.

Frequent opportunities were afforded to watch their method of climbing vertical surfaces. Every now and then one would, by a sudden, quick twist of its tail, propel itself up the side of the vessel to about half its length out of the water. Here it would remain quite motionless for a short time, adhering to

the side, and then, more often than not, drop or slide back into the water. Occasionally one would succeed in projecting itself almost clear of the water, when, after a short rest, it would draw the latter half of its body up into an S-shaped curve, and, using it as a fulcrum or support, would stretch itself further up, and, getting a fresh hold, draw its tail up again as before. Those in a glass vessel could not proceed further than the distance gained by the sudden impetus, owing to the smoothness of the glass; but others kept in a large wooden tank would often climb some distance. It was noticed, however, that to succeed in climbing any distance the surface must be moist. In several instances one or more of the "elvers" were found adhering to the sides of the tank quite dead. They had climbed a short distance up on to the dry surface, and, the moisture becoming absorbed, or, more possibly, the slimy secretion with which they are covered drying up, they were apparently unable either to proceed or detach themselves.

It is well known that eels are extremely voracious. In confinement I observed that they will occasionally attack one another, and on several occasions noticed one swimming about with the tail of one of its smaller companions half-way down its throat.

Eel-fares are not such rare occurrences in Victoria as was supposed, for we now have reliable evidence of their taking place in the Hopkins, Barwon, and Moorabool Rivers in the Western District and the Narracan Creek in Gippsland, where they have been observed on several occasions.

Being anxious to witness an eel-fare, and, if possible, obtain a photograph of the "elvers" in the act of climbing, I arranged with some personal friends in Gippsland to notify me when one was in progress. On 11th January last Mr. S. Dickenson informed me that on the previous day the elvers were climbing up the Narracan Falls in hundreds. I visited the spot on the following day, and was grievously disappointed to find they had all disappeared. I searched the stream both above and below the falls for some distance, but failed to find any. I remained in the locality over the next day, and visited the falls repeatedly, and finally followed the stream for about 6 miles without success. What had become of them? Had they gone back again down stream? I had heard of their sudden disappearance in the event of very wet weather, but on this occasion it was hot and dry. I have every confidence in my friend's veracity, and he informed me that when he saw them two days prior to my visit they were clinging to the vertical faces of the rocks at the falls in dozens. The falls are about 30 feet high, and form a formidable obstacle to the progress of the eels.

I was, however, more fortunate during a visit to the Hopkins River on 17th December last, in response to a note from Mr. James Evans, who stated that the eels were passing up both the Hopkins and Black's River falls.

The Hopkins Falls, which I visited first, are situated about two miles from Cudgee, and 12 or 13 miles by road from Warrnambool. They are formed by a large outcrop of basalt, which extends for a short distance above the falls, and forms the bed of the river. They are, roughly, about 300 feet wide and 30 feet high at the highest point. When the river is in flood the water rushes over in one unbroken sheet; but at the time of my visit it was divided into three separate streams.

Here I witnessed for the first time an eel-fare. Although not climbing in such quantities as I had hoped to find them, a large number of the eels could be seen about the foot of the falls, and numbers of others were, no doubt, concealed among the loose rocks and boulders scattered about in the stream. A few were noticed on the north side, but the majority had apparently selected the lowest and least difficult climb, close to the south bank. Just on the outer edge of the falling stream, where the rocks were kept constantly wet from the spray, masses of these slimy creatures could be seen squirming about deep down in the crevices between the boulders. There were dozens of them, of all sizes, varying from four or five inches to one foot in length. Numbers could be seen laboriously struggling up and slipping down the vertical fissures, which they seemed to prefer to the bare face of the rocks. Now and again a small one would painfully work its way up to a horizontal crack, along which it would slowly wriggle, and then start up the face of the rock itself, only, in nearly every case, to fall helplessly to the bottom again. Time after time they would try, often using the tip of their snout to assist in levering themselves up, gaining a few inches, a foot, or even a couple of feet, only to slip down again. It was almost painful to watch them, and one would be inclined to conclude that they could never succeed in reaching the top of the cliff. That they do so was proved by the fact that I saw one, about five inches in length, climbing a rock in the stream above the falls.

The manner in which they managed to adhere to the smooth, wet rock was wonderful. They seemed to flatten themselves, to some extent, against the surface, and, probably by suction, were able to retain their position. When climbing vertical surfaces they invariably formed the latter half of the body into the S-shaped or curved form already mentioned, and shown in the accompanying photographs.

On two or three occasions a small one, while climbing up the face of the rock, was seen to lose its hold and swing backwards.

PLATE XV.

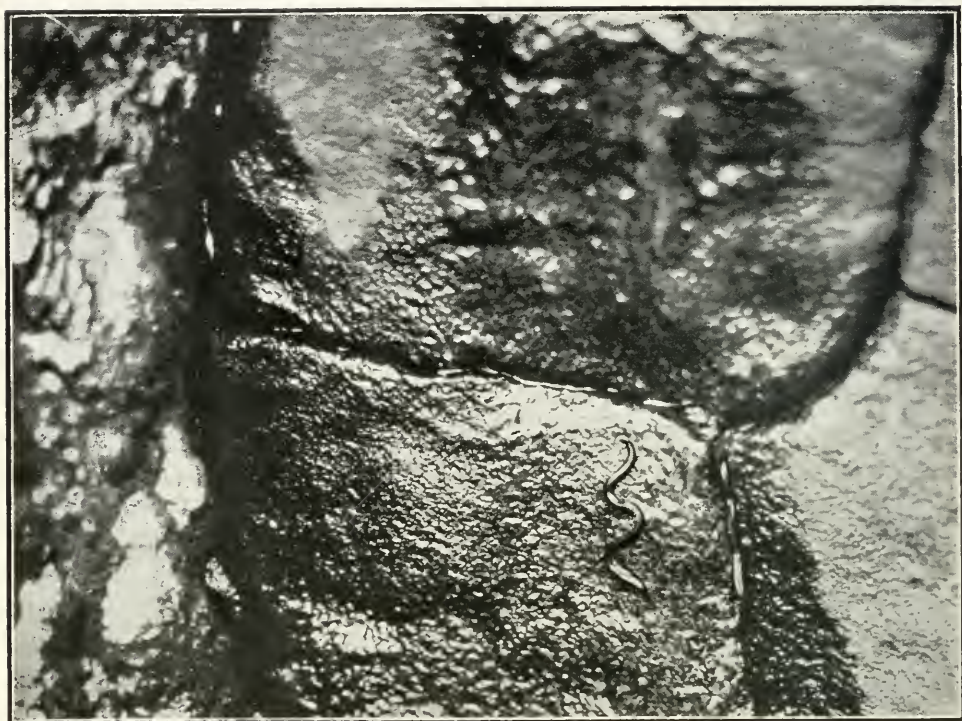


THE HOPKINS FALLS, NEAR WARRNAMBOOL, VICTORIA.



YOUNG EEL ASCENDING ROCKS.

PLATE XVI.



YOUNG EELS ASCENDING THE ROCKS.

but managed to adhere by its tail. I noticed particularly that the eels never attempted to climb up the rocks washed by running water, however little it might be; and from my observations I do not think it would be possible for them to retain a hold. They choose the places where the rocks are kept in a moistened condition by the spray, taking advantage of the slimy vegetable growths found here and there, through which they more easily wriggle, and avoid the rocks which are quite dry.

It is recorded that in some localities ladders of straw bands are constructed to aid their ascent. After watching them, one could quite imagine how much such a device would be appreciated and availed of.

It seems highly probable that many of the eels never succeed in passing the falls—at any rate, by climbing them—and the larger ones seen may be the unsuccessful ones.

Owing to wet and boisterous weather, I was compelled to make three separate visits to the falls, and the photographs were obtained under most difficult circumstances.

Black's River empties itself into the Hopkins some distance up the stream. My visit there was unsuccessful, although Mr. Evans assured me he saw the elvers ascending the rocks a few days previously. Later on, however, I noticed a few young eels passing up the stream, close in to the banks, in the direction of the falls.

It would be interesting to ascertain the rate of growth of the young eels. The elvers are believed to be a year old when they commence to migrate up the rivers. Of those I saw, probably one-fourth were ten inches or more in length. Could they be remnants from the previous year's migration which were unable to surmount the falls?

BOOK NOTICES.

THE GEOLOGY OF MELBOURNE. By G. B. Pritchard, B.Sc., F.G.S., Lecturer in Geology, &c., Working Men's College, Melbourne. Melbourne: P. G. Tait, 63 Queen-street. Pp. 187 (7 x 4½), with maps, &c. 4s.

IN this little work the author has, in clear and concise terms, dealt with the principal geological features in the immediate vicinity of Melbourne, and by a series of visits to ten different localities adjacent to the city has produced a handbook which will be of great value to the student and the visitor alike. For the special benefit of the student, and to pave the way for the remarks in the descriptive chapters, chapters on geological time; fossils, with a tabular synopsis of the animal kingdom; and the construction and reading of maps and sections, are included, the latter being a most useful addition.

The glossary of geological names and terms will also prove handy. Some forty illustrations, maps, and diagrams are included. The only defect which can be urged against the volume is the rather thin paper on which it is printed; but that may have been intentional, in order to make it more portable as a companion on a ramble.

AUSTRALIAN PLANTS, suitable for Gardens, Parks, Timber Reserves, &c. By W. R. Guilfoyle, late Director of the Melbourne Botanic Gardens. Melbourne: Whitcombe and Tombs Ltd. 478 pp. (8 $\frac{3}{4}$ x 5 $\frac{1}{4}$), with about 300 illustrations. 15s.

THIS long-promised volume has at last been issued, and, while its compilation and production must have entailed a great amount of work on the part of its author, for the sake of Australian plants, and the furtherance of their cultivation by public bodies and private persons, it were better it had not been written. As a guide to what plants of Australian origin, either showy, useful, or ornamental, it may be attempted to cultivate, it is perfectly useless to the average plant-lover. To call it a companion volume to Messrs. Lucas and Le Souëf's "Animals of Australia" is putting the latter in very poor company. Had it been written on the lines of the same publishers' "Plants of New Zealand," by Messrs. Laing and Blackwell, reviewed in these pages some four years ago, it would have been a work welcomed by botanists all over the world. As it is, unless a person is thoroughly well acquainted with Australian plants, and has the "Flora Australiensis," or Mueller's, Maiden's, Bailey's, and Tate's publications at hand, it will be impossible for him to make much use of the volume. For instance, what is the use of listing *Phylloglossum Drummondii* or *Stylidium despectum*, or many of the species of *Diuris*, *Pterostylis*, *Chiloglottis*, or *Caladenia* as plants suitable for gardens, parks, or timber reserves? Such plants should be indicated as fit only for treatment as pot plants under shelter. Who is likely to be able to grow *Caltha introloba*, *Celmisia longifolia*, or *Aciphylla glacialis* (all inhabitants of our highest Alps), and others of a similar character without notes as to their habitat and mode of treatment? The eight pages devoted to directions for sowing and raising Australian seeds, and the treatment of Australian plants, are so general that it is doubtful whether they will be of any use. Almost as much information can be got from Paxton's Dictionary, though it is forty years old. Should a person desire to plant a breakwind of Australian trees, or specimen flowering shrubs on a lawn, or an artificial fern-gully, he has no means of finding out from the information given as

to which would be suitable species to obtain. It is greatly to be regretted that the author, in publishing so-called common names for most of the plants listed, has failed to acknowledge the work in progress for the last two years by the Plant Names Committee of the 'Field Naturalists' Club of Victoria, which, under the chairmanship of the Government Botanist, is working in conjunction with the Government Botanists of New South Wales, Tasmania, &c., in order to try and secure uniformity in vernacular nomenclature. Surely such names as "Prickly-leaved Paper-bark Tree Myrtle" for *Melaleuca styphelioides*, or "Lance-leaved Swan River Red Pea-flower Bush" for *Brachysema lanceolatum*, cannot be in popular use, or have any claims to simplicity; while "Fringed Violet" for *Arthropodium paniculatum*, though shorter, is certainly misleading. To list such plants as *Anagallis Centunculus*, "Minute Pimpernel"; *Acæna ovina*, "Sheep's Burr"; *Alchemilla vulgaris*, "Lady's Mantle," and many others of similar character as Australian plants worthy of cultivation is surely the height of absurdity. Had the list of plants, which extends over 180 pages, and includes about 3,600 species and varieties, been cut down to one-fourth, and some remarks given as to the treatment and uses of the more promising of these, then plant-lovers would have had a valuable work of reference. Seeing that some three hundred illustrations are included, one might hope for some help from them; but, with the exception of a few characteristic palms, tree-ferns, the Bunya-bunya, and a few other trees, the majority of the illustrations are too indefinite to be of any value—in fact, if many of the titles were transposed nobody would be any the wiser. Who would recognize the Blackwood, *Acacia melanoxylon*, and *Bursaria spinosa* from the illustrations on page 257? while that of *Acacia Baileyana* might easily pass for that of a double-flowered Spiræa. The illustrations, as process engravings, are well done; but, being taken from specimens in the Melbourne Botanic Gardens, are, in many cases, surrounded with so much extraneous vegetation that the tree or shrub it is desired to illustrate is lost in a hazy mass. Not a single illustration is given of any Australian flower, though we have, belonging to our endemic plants, flowers which will bear comparison with any in the world for beauty of form, &c. The eucalypts, of which Australia is the home, are represented by a series of pictures which are little better than caricatures. The need of a book to fill the position indicated on the title-page undoubtedly exists, and from the author's long experience it was confidently expected that such a work would have resulted on the present occasion. The volume has been well printed and produced, and we regret that publishers of such high repute as Messrs. Whitcombe and

Tombs should be associated with a work which, while it accomplishes so little of real value, will only add to the difficulties of Australian plant-lovers.

THE SACRED LOTUS WATER-LILY.—The establishment of the beautiful water-lily, *Nelumbium speciosum*, in the Melbourne Botanic Gardens may now be considered certain. As recorded in the *Naturalist* for March last (*Vict. Nat.*, vol. xxvi., p. 180), through the courtesy of Dr. Holtze, Director of the Adelaide Botanic Gardens, a large clump of soil containing rhizomes of the plant was taken from the lake there and forwarded by express train at the end of August, 1909. The clump was placed in position in the lily lake in the southern portion of the gardens immediately after arrival. The plant grew and flowered fairly well last year, at this time, and it has since greatly increased, numerous flowers having been recently produced. The plant is stated to have been previously grown in Victoria on one or two isolated occasions, but it evidently was not established for any considerable length of time. It is found in the northern parts of Australia, but it is owing to the ancient worship of it by the Egyptians, as well as by the native inhabitants of India, Thibet, China, and Japan, where it is also found in a natural state, that it has become such an object of interest. The sculptured representations of the plant are said to abound among the ruins of ancient Egyptian temples, and it is figured in a manuscript, supposed to be of the 12th century, in a library at Florence. Mr. F. M. Bailey tells us that the root-stock and seeds are eaten by the aboriginals of North Queensland, as they are by the Egyptians and by the natives of India to-day. The leaves, which are circular in outline and peltate, with a radiating venation, spring from the horizontal root-stalks, and for a time float on the surface of the water, are themselves very handsome objects; afterwards they are elevated above the water by the lengthening of the stalks or petioles. These stalks abound in spiral fibres, which in India are carefully extracted and used as wicks to burn in the temples during religious ceremonies. The beautiful pink flowers are some six or eight inches across, and are borne on long stalks traversed by regular air-canals. The flowers consist of four or five sepals, with several rows of petals and stamens, attached at their bases to the receptacle, and a stigma which is sessile. The receptacle is funnel-shaped, and has been compared to an inverted wasp's nest. The ovaries are numerous, and placed in sockets in the upper surface. The seeds are without albumen, but have thick cotyledons. A white-flowering variety is said to be procurable in some of our northern States.—F. PITCHER.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 13th February, 1911.

The president, Mr. F. Wisewould, occupied the chair, and about 50 members and visitors were present.

ELECTION OF MEMBER.

On a ballot being taken, Mr. W. J. Code, Heathcote, was elected a country member of the Club.

GENERAL BUSINESS.

Mr. G. A. Keartland expressed his regret that the authorities had decided to alter the opening of the shooting season for quail from 1st March to 15th February, and said that, with a view of testing the condition of the birds, he had gone out on the previous Saturday, when his dog had put up a hen quail with seven chicks of very immature growth. He maintained that in such cases shooting the adult bird on the 15th inst. would mean the death of the young birds from starvation and want of protection.

PAPER READ.

By Mr. A. D. Hardy, F.L.S., entitled "On the Occurrence of a Red *Euglena* near Melbourne."

The author stated that he had prepared some notes in 1906-7 on observations made during 1905-6-7, and had been waiting for another favourable summer (which, however, had not occurred) in order to complete his investigations. Fortunately, sufficient material had been collected and examined to enable him to either uphold Ehrenberg's species, *Euglena sanguinea*, or to found a new species, which he provisionally named *E. rubra*. The paper was illustrated by specimens and diagram sketches on the blackboard.

Dr. T. S. Hall, M.A., congratulated the author on the trouble taken by him, and on the way in which the paper had been presented, and remarked that the evidence tendered seemed to him to be sufficient to separate the organism under notice from the common species, *E. viridis*. He mentioned also the occurrence of *Spherella* in some water in an old iron boiler at the University, where changes of colour were noted. It had to be remembered, however, that erythrin, as well as chlorophyll, could decompose CO_2 in the presence of sunlight.

Mr. J. Stickland mentioned the occurrence of *Spherella* under similar circumstances.

The chairman said the author had treated a technical subject in such a simple way that all present could take an interest in it.

NATURAL HISTORY NOTES.

Mr. J. W. Audas called attention to a photograph illustrating a curious growth by a eucalypt at Beaconsfield. The tree forked in the usual manner about ten feet from the ground, but the limbs had united again about fifteen feet higher up, and branched out afresh.

Mr. F. G. A. Barnard called attention to a statement in a recent publication, "The First Chapter in the History of Victoria," where the author, in describing the country near Sorrento, where the first settlement had been attempted in 1803, says:—"The aspect of the country then was totally different from its appearance now. The impenetrable tea-tree, which now covers the whole face of the peninsula—except in the clearings—had then not made its appearance, and did not make its appearance for more than a generation later. Instead of tea-tree, the ground was carpeted with grass, with scarcely a particle of scrub anywhere except in the swamps, and the hills and valleys were sprinkled with trees, which gave a park-like appearance to the landscape." He asked whether any member could support or disprove this statement, which, to him, seemed rather improbable. He had been under the impression that thickets of tea-tree were the original coverings of the land.

Dr. Hall said that it was quite possible the principal vegetation had altered as the author stated, and pointed out that at one time the district provided the Melbourne market with great quantities of firewood, principally Blackwood, *Acacia melanoxylon*.

EXHIBITS.

By Mr. F. G. A. Barnard.—Pot-grown specimen of fern *Lomaria fluviatilis*, showing fertile fronds; also beetle, *Catadromus lacordairei* (Carabidæ), taken at Kew.

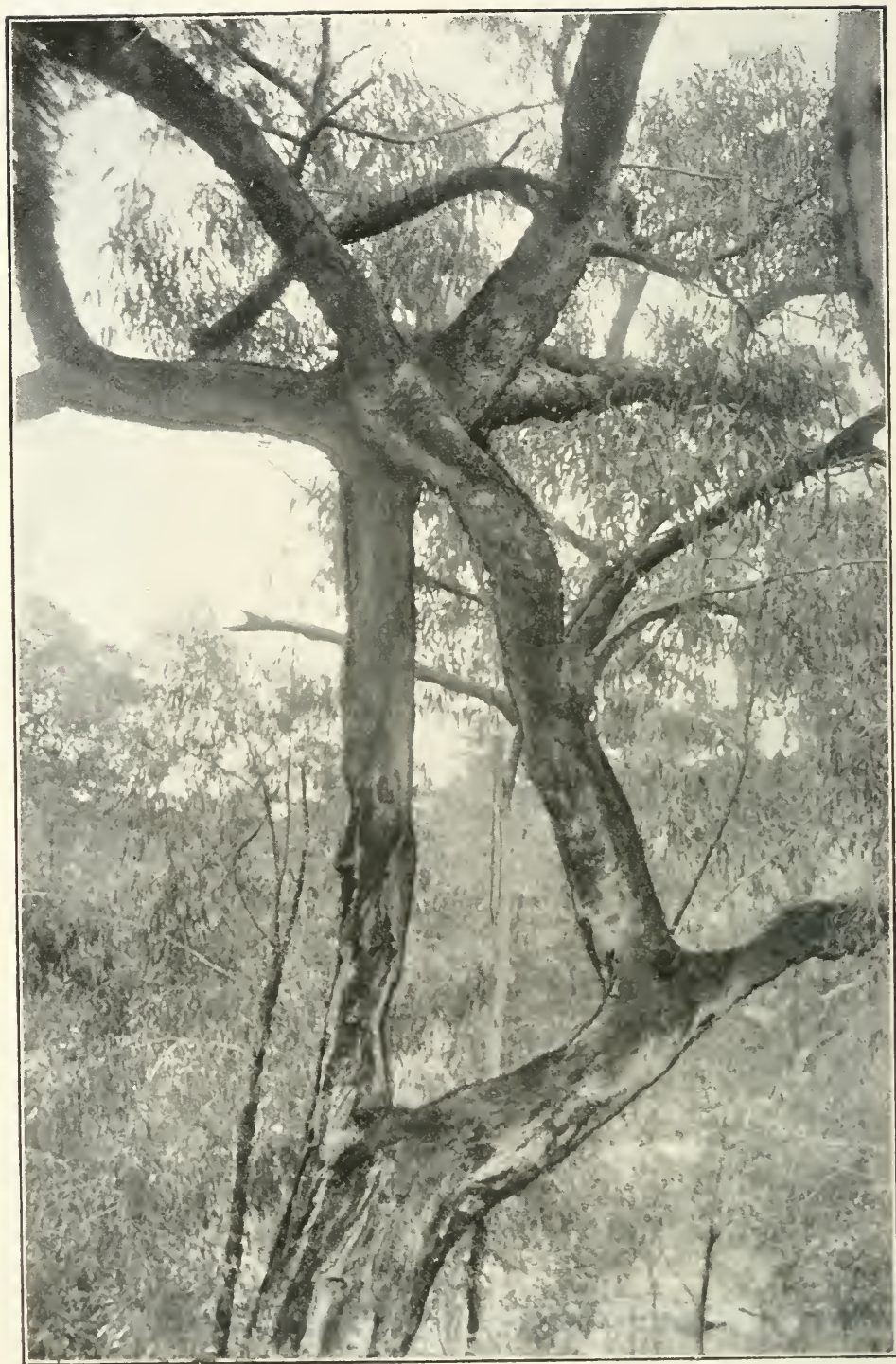
By Mr. F. Cudmore.—Fossil, *Bythotrepis* (?) *tenuis*, J. Hall, from Silurian (Barandella Shales) of Hatton's Corner, Yass, N.S.W.

By Mr. J. E. Dixon.—Flowers of *Melaleuca parviflora*, also Coleoptera, &c., from Parwan.

By Mr. C. J. Gabriel.—Shells, *Clavagella australis*, Sow., and *Turbo stamineus*, Mart., collected by exhibitor at Balmoral Beach, Middle Harbour, Port Jackson; also *Voluta irvinæ*, Smith, and *V. volva*, Chem., from Western Australia.

By Mr. A. D. Hardy, F.L.S.—*Euglena rubra*, n. sp., collected from small pool at Doncaster, 1906, in illustration of paper; also various infusorians.

PLATE XVII.



CURIOUS GROWTH OF A EUCALYPT.

By Mr. D. J. Mahony, M.Sc.—Alunite, from near Diggers' Rest; essexite, occurring as ejected blocks in the bedded tuffs surrounding Lake Bullenmerri, near Camperdown.

By Mr. P. R. H. St. John.—Dried specimens of *Olaix stricta*, R. Br., collected by exhibitor about six miles north-west of Cape Everard, December, 1910 (recorded by Baron von Mueller for Victoria, *Vict. Nat.*, vol. v., p. 60, but no Victorian specimens in National Herbarium); *Eucalyptus eugenoides*, Sieber, var. *nana*, Deane and Maiden, collected near Orbost, December, 1910 (not previously recorded for Victoria); *Brachyloma daphnoides*, Benth. (variegated form), collected near Myrniong, Bacchus Marsh district, October, 1910 (not previously recorded for Victoria).

By Mr. F. Wisewould.—An English viper, from Devonshire, England; whip snake; and young opossum taken from pouch of mother, Mornington, 1871.

After the usual conversazione the meeting terminated.

A REMARKABLE GROWTH BY A EUCALYPT.—While spending a week-end recently in the Beaconsfield district, Mr. M'Cann, the head teacher of the Beaconsfield State School, drew my attention to the peculiar growth of a eucalypt there. On examination, I found it to be *Eucalyptus elæophora* (*E. Cambagei*), known amongst bushmen as "grey gum," which is common in that district. This tree is about 15 feet in circumference at the base, and attains a height of about 50 feet. It forks about 10 feet from the ground, and unites again at about 25 feet. After this union, four large limbs spread out. The junction is quite three feet by three, and the limbs growing therefrom are much thicker than those below the union. This tree has a fair amount of foliage, and is remarkable for its unusually crooked growth of limbs. It is affected to a considerable extent by the parasitical mistletoe, *Loranthus pendulus*, which seems to be playing havoc with the timber. As this is a very unusual form of growth for a eucalypt, I had a photograph taken of it, which is reproduced herewith, as it seemed to be worthy of record and illustration, and would probably be of interest to many readers of the *Victorian Naturalist*.—J. W. AUDAS. National Herbarium, 13th February, 1911.

THE Historical Society of Victoria, founded some two years ago, has commenced the publication of its proceedings under the title of the *Victorian Historical Magazine*. The first number contains, among other items, an interesting paper by Mr. G. Gordon M'Crae on "The Early Settlement of the Eastern Shores of Port Phillip Bay," from which some idea of the original appearance of that part of the State can be gained.

RECENT BOTANICAL INVESTIGATIONS AT WILSON'S PROMONTORY.

BY J. W. AUDAS, Assistant, National Herbarium, Melbourne.

(Read before the Field Naturalists' Club of Victoria, 13th Jan., 1911.)

ON this occasion, being my third exploration of the National Park, Wilson's Promontory, accompanied by Mr. P. R. H. St. John, of the Melbourne Botanic Gardens, I left the metropolis by the 6.30 a.m. train on the 18th October for Fish Creek, which was reached about noon, where Mr. J. F. Falls, of that town, awaited us at the railway station with conveyances: and, after a hasty lunch, we started on a drive of thirty miles to the Darby River, reaching there about 7 p.m.

The country was undulating, and the road led through what must formerly have been a fine forest of eucalypts, which, rung by the settlers, now stood gaunt and dry, the principal species noted being *Eucalyptus regnans*, the so-called "Blackbutt," many of which appeared to be fully 250 feet high.

When passing over the Hoddle Range the leguminous shrub, *Pultenæa daphnoides*, was to be seen in the height of bloom, extending in bright yellow patches to the tops of the hills. From one of these summits we obtained a glorious view of the ranges traversing the Promontory, and a picturesque glimpse of Corner Inlet in the distance. Thence we descended into flat country, whose natural boggy state was somewhat aggravated by recent rains, and experienced great difficulty in getting through the worst places—indeed, one of our horses sank to such a depth I doubted if he would ever reach *terra firma* again.

On reaching Shallow Inlet the tide was out, and we were fortunate in being able to travel about 15 miles along the beach, which was a great relief after our experience on the boggy roads. This route led us over a portion known as "The Drift," where moving sands form into large dunes, which are continually shifting about; but a little further on I noticed this migratory tendency was held in subjection by two binding grasses, *Spinifex hirsutus* and *Festuca littoralis*. Here we observed numbers of Swans and Sea Curlews, while running along the beach were Pacific Gulls, Dottrels, and Sooty Oystercatchers.

Turning inland, we wended our way to Mr. Falls' estate at Darby River, where a camping-house is erected, and after some refreshment we were glad to retire at once, in order to be ready for an early start on the following morning; but, weary though we were, sleep was denied us, as we were kept awake by the continuous croaking of frogs in adjacent water-holes, each species of frog having a different croak. The effect of this

inharmonious combination being beyond my powers to describe, I leave it to your imagination. Thus far on our tour we had enjoyed the company of Mr. Peverill, of the Lands Department, who had come to make advance arrangements for the members of the National Park Committee and the Governor's party, who were to arrive the next day.

On the morning of the 19th inst., when travelling through heathy country in the direction of Mt. Vereker (2,092 feet high), we noticed an abundant growth of the pretty orchid *Caladenia Menziesii*, and our admiration was excited by the beautiful blooms of *Burchardia umbellata*, which grew profusely, and quite monopolized one plot where a portion of the former vegetation had been burnt off. On the mud flats below the range we found some very minute plants, such as *Drosera pygmæa*, *D. spathulata*, and *Stylidium* (*Candollea*) *perpusilla*; but to see them one had to crawl on hands and knees. A semi-aquatic plant, *Brachycome cardiocarpa*, lined the edges of the swamps, making a pretty white border. On the slopes the foliage of *Pultenæa daphnoides* and *Aotus villosa* (plants of the Leguminosæ), formed a pretty contrast to the dull tones of the granite boulders projecting among them, but at a higher altitude the boulders themselves were made verdant by luxuriant growths of ferns filling all the crevices, *Polypodium grammitidis* and *Woodwardia aspera* being two species not previously collected.

On the summit of the north-eastern portion of Mt. Vereker a contractor had felled some fine specimens of *Eucalyptus Muelleriana*, which is the chief timber tree there, and he was reducing them into posts for the park fence. Further along the range the vegetation is very varied and luxuriant, consisting largely of *Pultenæa scabra*, *P. mollis*, *Indigofera australis*, *Goodia lotifolia*, *Hibbertia Billardieri*, var. *monadelpha*, *Daviesia ulicina*, *Kunzea coriolia*, *Spyridium parvifolium*, and *Melaleuca squarrosa*. On our way back to the camp-house we passed through a very fine grove of *Banksia serrata*, and on one of these trees a hive of bees were busy forming comb. We were greatly surprised to note that they were attaching it to the bare limb, this being a very unusual spectacle, as bees generally select a hollow in which to store the fruits of their labour.

On the 20th inst. we purposed to explore Mt. Leonard, and after crossing the Darby River found ourselves confronted by its steep and precipitous sides, rising to a height of 1,860 feet, which were very difficult to negotiate; but we were determined to reach and explore its summit, in the hope of securing further additions to the flora, and, after a strenuous climb, we were rewarded by finding the following:—*Daviesia ulicina*, var. *ruscifolia*, *Hydrocotyle callicarpa* (a very small plant of

the Umbelliferæ), *Xanthosia pilosa*, *Platylobium obtusangulum*, *Brachycome scapiformis*, *Acianthus exsertus*, *Thelymitra longifolia*, *Pterostylis vittata*, *P. reflexa*, and *P. pedunculata*. We were astonished to find *Helichrysum Baxteri* flourishing on the apex of the mount, as this species is usually found on flats. Several eucalypts were in bloom, the flowers being much larger than usually seen, those noted being *Eucalyptus obliqua*, *E. amygdalina*, and *E. globulus*.

The next day's trip, to Fraser's Creek, at the foot of Martin's Hill, was delightful. Beauty surrounded us everywhere, growing more bewilderingly lovely as we proceeded. The bright flowers of the showy *Olearia* (*Aster*) *Huegelii* were vying with those of *Gompholobium pedunculare*, in glowing yellow and red, while clumps of *Kunzea corifolia*—a very ornamental shrub of the myrtle family—stored nectar for the wild bees in its masses of snowy blossoms, and our admiration was enhanced when, a little further on, we found the beautiful *Dillwynia floribunda* literally covering the plain, its racemes of red and yellow flowers forming an effective colour scheme. After travelling some distance over a heathy plain we found the vegetation becoming more luxuriant as we approached the Tidal River, comprising chiefly *Melaleuca ericifolia*, *Acacia verticillata*, *Pultenæa stricta*, *Cyperus lucidus*, *Arundo phragmites*, *Restio tetraphyllus*, and *Mesomelaena sphærocephala*. When passing over the "Bad Saddle" (a very difficult part of the track on Mt. Oberon) we noticed *Callistemon lanceolatus* just bursting into bloom and abundance of *Comesperma ericinum* and *Lycopodium densum*. The flowers of the former, seen from a distance, greatly resemble *Indigofera australis*, the "Wild Indigo."

Growler's Creek wanders through a treacherous quagmire, across which a corduroy track is laid, and we noticed the carcasses of no less than six beasts which had strayed off the track and had immediately become hopelessly stuck in the bog. In this vicinity the sundews *Drosera binata* and *D. auriculata*, plants of carnivorous habits, were plentiful.

Pitching our camp on the bank of Fraser's Creek, we took the packs from our horses and left them to the care of our young guide (Mr. Gordon Patterson, of Fish Creek, who, I should like to here mention, accompanied us throughout the trip, and to whom the topography of the Promontory is well known), and, feeling very fatigued from our long walk over this rough part, we welcomed the night's rest, and were soon sleeping, despite the incessant calls of a Boobook Owl.

Early next morning we desired to pursue our investigations on Mt. Norgate (1,390 feet high); but in order to reach it we had to cross the Oberon Bay valley, which extends right to

the sea coast, a distance of three or four miles. The valley itself is somewhat dreary, consisting of sand hummocks covered with bracken, *Poa cæspitosa*, and stunted specimens of *Eucalyptus viminalis*; but, nevertheless, it seemed a locality favoured by members of the animal kingdom, for we saw wallabies and native bears frequently as we passed along.

Near the sea-coast, at the south-west corner of Mt. Norgate, we obtained *Pultenæa canaliculata*, *Mesembryanthemum australe*, *Cotula filifolia*, and *Scirpus inundatus*, all of which were additions to the collection of flora. On the coast *Scævola suaveolens* was seen in fruit, its succulent fruit greatly resembling that of *Eugenia Smithii*, "Lilly-pilly." On the slopes of Mt. Norgate the vegetation is very dwarfed, consisting of *Banksia marginata*, *Casuarina distyla*, *Persoonia juniperina*, *Hakea acicularis*, *Leptospermum scoparium*, and *Melaleuca squarrosa*. On the summit the principal tree is *Eucalyptus globulus*, but it does not there attain its usual height and proportions.

Our observations next day attracted us in the direction of Waterloo Bay. On the banks of a creek which we crossed on our way the "King Fern," *Todea (Osmunda) barbara* grew luxuriantly in the company of *Dicksonia Billardieri*, the common "Valley Tree-fern." The flats near the bay are clothed in stunted vegetation, consisting chiefly of *Acacia myrtifolia*, *Melaleuca ericifolia*, and *M. squarrosa*, none of which attained a height of more than about eighteen inches, and there were also specimens of *Sprengelia incarnata*, *Leptocarpus Brownii*, *Cladium junceum*, *Schænus brevifolius*, and the unique fern, *Schizæa bifida*. On the beach the usual coastal plants abounded, from amongst which we singled out for special observation a very dwarfed form of the eucalypt *E. capitellata*, which was badly infested with a parasitical plant, *Cassytha melantha*, whose growth had formed tangles like strings from branch to branch.

Leaving Waterloo Bay flats, we proceeded as far as Boat Harbour Hill, and thence along the ridges to Martin's Hill. The route was thickly timbered with eucalypts — viz., *E. globulus*, *E. capitellata*, *E. macrorrhyncha*, and *E. obliqua*, the three last-mentioned species having thick, persistent, fibrous bark, which protects the wood from the ravages of fire. A large bush fire had swept through these parts about three years ago, and we noticed that on these fibrous-barked trees, although it had killed the branches and singed the bark black, fresh growths had since shot forth from the trunks, whereas the smooth-barked species were nearly all killed by the flames.

At the heads of many deep gullies great granite boulders projected, but were not to be seen on the slopes at all. Here *Amperea spartioides* flourished exceedingly, and its leaves

seemed to be a favourite diet of the wallabies, although it belongs to a poisonous order, the Euphorbiaceæ. The other vegetation included much tall bracken, *Hedycarya Cunninghami*, *Olearia* (*Aster*) *argophylla*, and *Cassinia aculeata*; and during the whole day's arduous search we only found one new plant—*Acacia longifolia*, var. *floribunda*.

Next day we were much more fortunate. On this occasion we travelled along the coast track to Darby River, passing *en route* over the western portion of Mt. Oberon (1,568 feet in height), coming again upon our former acquaintance, Growler's Creek, near the foot of High Peak. In this vicinity we were fortunate in securing new additions—*Agrostis venusta*, *Xanthosia dissecta*, *Gratiola Peruviana*, var. *pumila*, and *Gnaphalium candidissimum*, while comprising the other vegetation were *Eucalyptus globulus*, *Myoporum insulare*, *Helichrysum ferrugineum*, *Atriplex cinerea*, and *Correa alba*, the smaller plants being *Isotoma fluviatilis*, *Ajuga australis*, *Colobanthus Billardieri*, *Cyrtostylis reniformis*, *Sagina apetala*, *Tillæa macrantha*, and *Centrolepis strigosa*. From thence on for a considerable distance we passed over open heathy rises, and noted *Helichrysum apiculatum*, *H. Baxteri*, *H. lucidum*, and *Thomasia petalocalyx*, and were greatly pleased to find *Grevillea lavandulacea* growing abundantly. Passing thence over part of the track known as "Pinchgut," we were soon in sight of the Darby River again, whose flats, with *Acacia verticillata* in full bloom, were a glorious sight viewed from Leonard Range. On these flats we gathered the following new additions:—*Lycium horridum*, *Fumaria officinalis*, *Trifolium arvense*, and *Spergularia rubra*.

The next day was devoted to scouring all the flats in the vicinity of Mt. Vereker in search of aquatic plants. Here and there were clumps of taller vegetation—*Eucalyptus viminalis*, *E. Gunnii*, var. *acerula*, *Leptospermum pubescens*, *Acacia melanoxylon*, *Leucopogon Richea*, usually a coastal plant, and *Melaleuca cricifolia*, whose masses of white flowers could be seen from afar off. The lagoons visited revealed a luxuriant growth of *Myriophyllum variifolium*, *Potamogeton natans*, *Ranunculus aquatilis*, *Triglochin procera*, the rush-like *Eleocharis acuta*, and near the margins the principal plants were the sedge *Cyperus lucidus*, with *Craspedia Richea*, *Epilobium glabellum*, *Sium latifolium*, *Claytonia australasica*, and the pretty introduced daisy, *Bellis perennis*.

Near the edge of a flowing stream we found a small creeping plant, *Myriophyllum amphibium*, belonging to the Haloragaceæ, which was a new record for the south, this species being only previously found in Victoria at Curdie's River, in the south-western district.

An erect, slender annual, of one or two inches in height—

Selaginella Preissiana — belonging to the Lycopodinaceæ, grew in moist places, and this, with *Cotula australis*, *Mentha Pulegium*, *Cerastium quaternellum*, and *Centrolepis fascicularis*, were all new additions to the flora.

Our wanderings led us on the following morning in the direction of Five-Mile Beach, a distance of twenty miles from Darby River, through grass-tree plains, on which the more striking plants were *Sowerbæa juncea*, *Pimelea phyllicoides*, *Dampiera stricta*, *Tetralthea pilosa*, *Thelymitra aristata*, *Tricoryne elatior*, *Cyathodes acerosa*, *Stylidium* (*Candollea*) *graminitolium*, and *Patersonia glauca*, the latter being well out in bloom; but it is advisable to admire its delicate bluish flowers upon the plant itself, because they perish almost immediately if gathered. The swampy parts were occupied by *Hakea pugioniformis*, with its rigid, sharp leaves and dagger-shaped fruit, while here and there *Pullenæa villosa* formed isolated patches of scrub.

In a deep gully at the head of Chinaman's Creek are some splendid specimens of eucalypts *E. obliqua* and *E. Muelleriana*, but more particularly the Blue Gum, *E. globulus*, one of which measured 40 feet in circumference at a height of six feet from the base, and it was in this gully also that we noticed some fine "Lilly-pillies," *Eugenia Smithii*, in fruit, and clothed to their highest branches by the climbing fern *Polypodium pustulatum*. On a portion of the plains known as the "Sugar-basin," where the ground is of the same treacherous and boggy nature as met with at Growler's Creek, the hoarse cry of hundreds of crows wheeling and circling about bore ominous tidings of some unfortunate beast perishing in the bog. From this point to the Three-Mile Beach the country had been recently swept by fire, and we were interested and somewhat surprised at the rapidity with which certain plants had re-asserted themselves, those flourishing exceedingly being *Diplarrhena Moræa*, *Chamæscilla corymbosa*, *Helichrysum scorpioides*, and *Burchardia umbellata*.

We had a very rough experience in making our way down the precipitous hills towards Five-Mile Beach, the overgrown vegetation, consisting of the Wire-grass, *Tetrarrhena juncea*, combined with *Bauera rubioides* and *Acacia verticillata*, being almost impenetrable; but, thanks to the astuteness of our guide, Mr. Patterson, we reached the beach safely at last. After fording Boys Creek (which is quite a large stream at its mouth) we proceeded in a westerly direction, and our attention was quickly attracted by a perennial grass with a splendid tendency for covering surfaces, its shoots reaching three or four feet in length and rooting at every joint. It seemed also well adapted to endure long privations of moisture.

Growing in the sand on the beach was a plant, *Stackhousia spathulata*, which gave us some trouble to identify, owing to its having formed succulent leaves through the presence of salt. Abundantly conspicuous on sandy spots near the sea was *Kennedya prostrata*, or "Running Postman," so-called from its flowers, which are usually bright crimson, but we came upon some which were white. Other additions to the flora of the Park found along the beach were *Olearia (Aster) glutinosa*, *Acacia longifolia*, var. *Sophoræ*, *Helichrysum rosmarinifolium*, *Sebæa albidiflora*, and the introduced composite, *Senecio elegans*. On the lagoons and watercourses in the vicinity of Boys Creek we also reaped a rich harvest of new additions to the flora. We found plants of aquatic and semi-aquatic habits, such as *Glyceria fluitans*, *Hydrocotyle vulgaris*, *H. asiatica*, *Elodea verticillata*, *Myriophyllum elatinoides*, *Cardamine parviflora*, *Chara fragilis*, *Nitella gelatinosa*, *Nasturtium officinale*, and *Potamogeton lucens*. The latter is a submerged plant, and, although mentioned in the "Second Systematic Census of Australian Plants" as found in Victoria, no specimens of it were in the Australian collection of the National Herbarium.

To climb the steep hills on the return journey was a formidable undertaking, but it had to be accomplished, and, after encountering considerable difficulty, we reached the open country and camped for the night. Next day we proceeded by Darby River to Fish Creek, and entrained for Melbourne, feeling greatly pleased with the knowledge and specimens acquired on this our third visit to the Promontory.

It may be mentioned that the National Park, which contains some 101,000 acres, or nearly 160 square miles, of very diversified country, has now a recorded flora of just 600 species of indigenous plants. The parts traversed on the present occasion may be easily made out on the map of the Promontory published with the *Naturalist* of February, 1909.

BROADBENT'S MAP OF VICTORIA.—The 1911 edition of this publication is a great improvement on its predecessors. It is now printed in three colours, and on a larger scale. The map of Central Victoria, in the last edition, has been published separately, with notes on various holiday resorts, as "Map and Guide to Fifty Miles Round Melbourne," and as such will be a valuable help to naturalists and others when planning their outings.

ON THE OCCURRENCE OF A RED EUGLENA NEAR
MELBOURNE.

BY A. D. HARDY, F.L.S., F.R.M.S.

(Read before the Field Naturalists' Club of Victoria, 13th Feb., 1911.)

IN the summer of 1904 I received, through the courtesy of Mr. F. G. A. Barnard, a small phial of brick-red fluid containing "pond scum" from Doncaster, Victoria, and which he suggested might be a form of *Alga*. The red matter, which had been well shaken in transit, soon precipitated and was lifeless, the force of offensively-smelling gas being sufficient to blow the partially loosened cork out of the phial. Though decomposition had made rapid progress, the nature of the material was still discernible as composed of spherical cysts of brick-red granular substance, the individual cells, which were without integument, differing from each other only in size, and that, in the majority of cases, only slightly. More than a month passed before I obtained from the same source a further supply, and this came to hand in a non-fluid state, with the odour, colour, and plasticity of the anchovy paste of commerce. This soiled the fingers with a smear as of greasy clay, not removed by means of cold water only, but yielding easily to alcohol, benzine, methylated spirits, and the like.

No opportunity offered of prosecuting the inquiry further at that time. Next summer I visited the locality on receipt of a report from Mrs. Holden that the "red scum" had appeared; and, after microscopical examination of the living organism, found that not only was it a *Euglena*, but that in many respects it differed from *E. viridis*, Ehrenb., the only form with which I had any acquaintance. On reference to available literature (a list of which is appended), and after some years of observation in the field, and further microscopical examination, it seems to me that it may be necessary to constitute a new species; and for this I provisionally propose the name which is henceforth used in this paper—viz., *rubra*.

Doncaster is a portion of undulating country of Upper Silurian formation, about 8 miles from Melbourne. To a large extent it has been cultivated by orchardists, whose water supply for stock, &c., is obtained from shallow artificial catchments—excavations and dams—that are filled by direct rainfall, surface drainage, and percolation. The water in these holes is generally of a creamy or yellowish colour, due to the soil, which, judging by the presence of quartz veins of considerable length, is derived from rock decomposed *in situ*. In late spring, during summer, and in early autumn a scum of *Euglena viridis* frequently forms on these waters, and persists through the calm, warm weather, but disappears with a fall

of temperature, or when the surface of the water is much disturbed by wind, to reappear during the next calm, hot period.

There is, however, one hole that differs from others of the locality in having less surface and greater depth (these being about 3 metres and average 2.5 metres respectively), while, instead of the water being coloured and impinging on sloping clayey banks at the surface, as in the case of the dams, &c., it is colourless, and in contact with the humic layer which underlies the grasses which surround it. This hole has its supply considerably increased by a natural gutter draining from the country road. From the owner of the orchard I learned that this hole was in part formed by the grubbing of an old eucalypt stump, which left an excavation 1.5 m deep, which filled with water, and remained so for some years without any scum, green or red, appearing. In 1904 the hole was deepened by the removal of stone from the bottom, and the present depth attained. In the following and succeeding few years the red scum appeared regularly during air temperatures of between 90° and 100° Fahr., until the summer of 1907-8, during which there was not a sufficient duration of heat to produce a visible scum on any of the pools, nor has the red form appeared since in that locality, although a small quantity of *E. viridis* was evident on two occasions on the surface of neighbouring dams.

Although in the red scum *E. rubra* predominated, there was present, though not macroscopically, a small quantity (about 1 per cent.) of *E. viridis*. Necessarily, the search amongst countless myriads of organisms of a kind for something abnormal must be inexhaustive, but in the many samples taken from other waters in which *E. viridis* was plentiful, not a single red organism was seen, nor was there any trace of red colour, excepting the "eye-speck," observed in any of the many thousands of *E. viridis* from those localities or from the pool containing the red form.

Between the largest specimen of *E. viridis* and the smallest of the red form there was a noticeable interval which I failed to bridge (for difference in average size see Plate XVIII.—fig. 1, *E. rubra*; fig. 2, *E. viridis*); but, according to measurements given by Saville Kent, this difference holds good only for this region.* After due consideration of Saville Kent's statement, when rejecting Ehrenberg's *E. sanguinea*, to the effect that the red colour was merely one of the mature phases of *E. viridis* which he had proved by experiment was capable of ingesting particles of carmine in solution, I cannot make it apply to the species under consideration. *E. viridis* is generally

* The "Cambridge Natural History" gives 1 mm for length of *E. viridis*, which, while falling short of that given by Saville Kent, Parker, and other observers, agrees better with what I have personally seen.

described as having green colour filling the cell, excepting the anterior end and the tail-like posterior, which are hyaline. In *E. rubra* the red colour (erythrin?) that pervades all parts of the cell, excepting the posterior end (where the tip may be hyaline or sometimes about .1 of the organism's length green) is usually dense to the anterior extremity—very rarely a trace of green—so that the eye-speck, of same hue, was difficult to distinguish.

Under a magnification of about 1,500 diameters (Leitz's oil immersion and Watson's E eye-piece with Abbé condenser), the red specks which gave the colour to the living organism appeared to be constantly forming by the aggregation of still more minute particles, which seemed to be attracted by a centripetal force until the compound particle had reached a certain size, while other particles appeared to break up or dissolve away. I can offer no explanation of this, unless it is part of the process of resorption. I did not observe any chromatophores, such as described by Miss Sallitt or Professor Bower.

When red organisms of this species encysted, any green colour present took up a peripheral position, and if preserved alive the green soon disappeared, leaving only the red cysts previously described. The red particles seemed to be contained in globules of oil, having an appearance something like that of fig. 3 of the accompanying plate—globules which crowded the cell from end to end. Specimens mounted in formalin had in a few years lost most of their pristine colour, nor could I observe the globules already noticed; but most cells were crowded from stem to stern with grains (paramylon?) measuring up to $6\ \mu.$ x $4.5\ \mu.$, and which showed no reaction to iodine, iodine and sulphuric acid, or chlor-zinc-iodine. No red particles were then visible. Instead, a red-coloured oil partly suffused the cells, and formed a film which coated the grains more or less, as shown in fig. 4. In another mount (the medium being in doubt, but probably formalin), some red oil, extruded from a cell, formed in globules of varying sizes (and of colour similar to the red "No. 1" of the type colour-chart under "Spectrum" in the Standard Dictionary), and I was surprised to find these exhibiting Brownian movement, the smallest vibrating more rapidly than the larger, but all of slower movement than the solid particles in vacuoles of *Closteria* and *Pleurotenia*. My limited literature on the subject gives me no information of Brownian movement of oil globules in liquids of different densities, and, for all I know to the contrary, this may be a novelty.

When equal quantities of *E. rubra* and *E. viridis* were kept separately in shallow dishes and in specimen tubes, it was

noticed that when exposed to direct sunshine gas-bubbles were given off plentifully by the green form, but slightly by the red; and this and other circumstances suggest a character for *E. rubra* more holozoic than holophytic. When red and green organisms were mixed in approximately equal quantities, and kept alive in water from a garden liquid-manure tank, the proportion remained the same. Nor did the experiments with the medium have any visible effect on the respective colours. Proceeding on the theory of ingestion that led to Saville Kent's rejection of *E. sanguinea*, I placed red *Euglenæ* in water from the green *Euglena* pools, and *vice versa*, but found no result; and, having finely powdered the ferruginously-stained rock from the red *Euglena* pool, could find no trace of an ingested particle in any green or red organism. That any "mature phase" should be absent from *Euglenæ* of all the waters of this locality but this pool seemed unreasonable; yet the possibility of the deeper, colder, and comparatively dark pool producing a phase that was not within the influence of the more open, shallower, and consequently better lighted and warmer water of the adjacent dams, still exists.

When sunlight was withheld for a time, or the water temperature reduced, or the surface agitated, the green organisms were the first to encyst. In experiments with cocaine, &c., it was found that *E. viridis* was sooner narcotized than *E. rubra*.

Although having the characteristic Euglenoid movement and rotation on longitudinal axis which makes the progression of the cell a boring one, these movements were all slower than those of *E. viridis* under similar conditions of light, medium, temperature, &c. The action of the flagellum also was slower, the media used being dilute glycerine and water, gum water (prepared from gum of *Acacia pycnantha*), &c.

The surface striations or corrugations make, with the longitudinal median line, an angle of about 30° or less, completing not more than one spiral turn around the body, and are about 1 μ . apart. If it be supposed that *E. rubra* is a large, lazy, heterochromatic *E. viridis*, then the spiral markings might be expected to be further apart on a distended cuticle. I have not measured the striations on *E. viridis*. This spiral grooving has, I think, some use in the boring progression of the *Euglena*, much as a bullet is rotated by the rifling of the gun-barrel. Is it not a fact that other flagellates lacking this spiral grooving do not turn on the longitudinal axis as the *Euglena* does? The cuticle is faintly corrugated by this marking, each line having a broken appearance. The effect is not given only by markings or fibres seen through a smooth cuticular layer.

Though published in 1900, Wagers' informative article on the eye-spot and flagellum did not come under my notice until

the opportunity to—thus specially directed—examine the living cells more carefully had passed, but in any case the red colour and the abundance of granular matter would have made this task a difficult one.

The red form *en masse* sooner decomposed than the green, and gave off a sickening odour unlike the other, and also more rapidly accumulated fungoid growths.

Experiments with the habitat were rather inconclusive, owing to the recent succession of cool summers in southern Victoria largely checking the appearance of *Euglena* of any kind; but during the one summer when this was practicable a quantity of red *Euglena* transferred to one of the adjacent dams—the nearest, about 100 metres distant—either succumbed or failed to multiply, as, months subsequently, examination of the water revealed not a single cell. Nor did any visible increase take place that season in the amount of green forms that were liberated in the small pool. Associated with the *Euglena* of this pool were some diatoms, desmids, &c., and some anabœna, all in small quantity.

I have, at perhaps inordinate length, taken pains to describe the environment and habitat of this red form in the hope that further attention will be given to similarly coloured *Euglenæ* elsewhere; but, even if the stability of *E. sanguinea* holds good, the shorter flagellum and other characters are, I think, sufficient to establish *E. rubra* as a species.

DESCRIPTION.

Size.—Motile cell, excepting flagellum, up to 200 μ . by 60 μ . diam.; encysted, up to 80 μ .; flagellum slightly shorter than body.

Form.—Cylindro-fusiform, but less fusiform than *E. viridis*; anterior end rounded; posterior end rather suddenly reduced, and continued as a short cylindrical extremity, with rounded tip. Frequently with greatest girth behind centre.

Markings.—Cuticular furrows or ridges about 1 μ . apart, and forming, with the longitudinal median line, an angle of 30° or less, and making less than one complete spiral turn round body.

Eye-spot.—Situated as in *E. viridis*, but occulted by grains and red colour of cell.

Gullet and vacuoles.—Imperfectly observed.

Origin of flagellum, and relation of flagellum to eye-spot, not satisfactorily observed.

Nucleus.—Situated a little behind middle, within greatest girth.

Colour.—In living organism, ruby red, usually under low power of magnification, filling the cell—all but the posterior

extremity, which is hyaline or rarely green, but with no chlorophyll corpuscles; turning to (*post mortem*) dull red. Red particles (fig. 3) due to intracellular origin, and not ingested.

Grains (paramylon?).—Almost filling cell. Not affected by iodine, iodine followed by sulphuric acid, nor chlor-zinc-iodine which stained protoplasm and nucleus brown; oblong, hyaline, maximum size $6\ \mu.$ x $4.5\ \mu.$ (fig. 4).

Encystment.—In a reticulated stratum with compartments approximating to hexagons (fig. 5).

Locality.—Doncaster, Victoria, 1904-7.

Habitat.—A small pool.

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EXPLANATION OF PLATE XVIII.

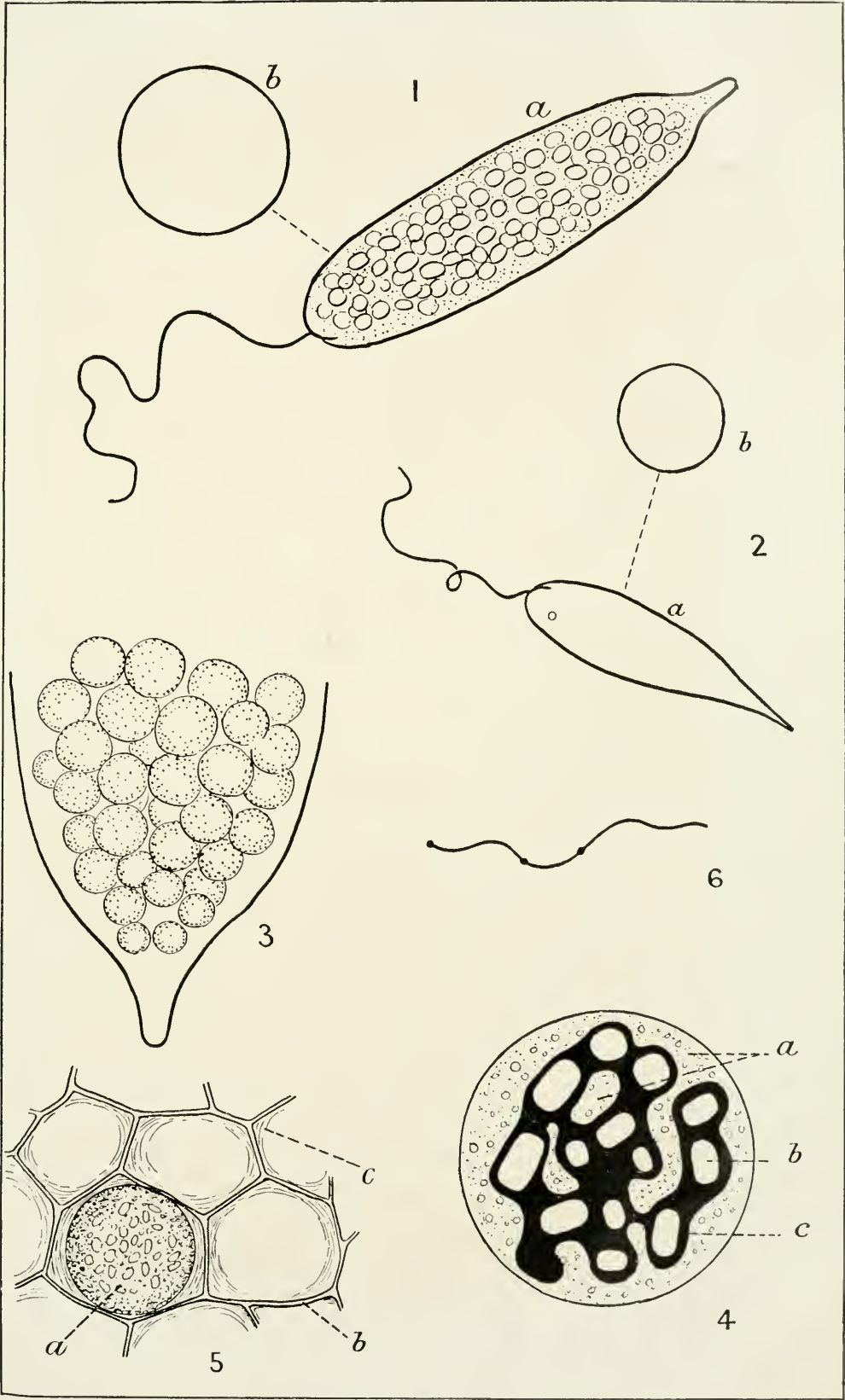
Fig. 1.—*E. rubra*, motile and encysted; and 2, *E. viridis*, to same scale. (Cameral lucida drawing.) x 450±.

Fig. 3.—Posterior end *E. rubra*, showing globules and red particles observed in living cells, 1905; c.l. x about 1,000.

Fig. 4.—Showing encysted *E. rubra* with inter-granular red oil. First noticed after being mounted some months in formalin.

Fig. 5.—Encystment stratum. (a) A resting *Euglena*, (b) septum, (c) bedding. (The empty compartments have been vacated by cells which have resumed motility.)

Fig. 6.—Nodulated flagellum, with three nodules—one at extremity; occasionally seen.



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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 13th March, 1911.

The president, Mr. F. Wisewould, occupied the chair, and about 70 members and visitors were present.

REPORTS.

A report of the visit to the Botanical Gardens on Saturday, 25th February, was given by the leader, Mr. F. Pitcher, who reported a good attendance of members. Attention had been principally given to the fine collection of trees, shrubs, and plants representing the flora of Australia, but the time of year was unsuitable for seeing many of them in bloom.

A report of the excursion to Broadmeadows on Saturday, 11th March, was given by the leader, Mr. F. G. A. Barnard, who also reported a good attendance of members and an enjoyable afternoon. Gellibrand's Hill, the nearest outcrop of granite to Melbourne, was visited, and notes given of the various interesting objects met with during a seven-mile walk.

A report of the junior excursion to Fairfield on Saturday, 4th March, under the leadership of Mr. H. W. Wilson, was given by the juniors' secretary, Mr. C. Stout, who stated that the attendance had been rather small, but that a number of interesting features were discussed during the afternoon.

The hon. librarian reported the following additions to the library:—“Ants: their Structure, Development, and Behaviour,” by W. M. Wheeler, Ph.D.; “The Geology of New Zealand,” by Jas. Park; “Handbook of the Birds of Tasmania,” by F. M. Littler; “Australian Plants,” by W. R. Guilfoyle; “Extinct Monsters and Creatures of Other Days,” by H. W. Hutchinson; “Voyage of the *Discovery*,” by Capt. R. Scott; “A Guide to the Natural History of the Isle of Wight,” edited by F. Morey, F.L.S.—all purchased. “Pebbles,” by E. J. Dunn, F.G.S., from the author; “The History of Kew, Victoria,” by F. G. A. Barnard, from the author; “Plants Indigenous to Victoria,” vol. ii., by Prof. A. J. Ewart, D.Sc., from the author; “Annual Report, Secretary for Mines, Victoria, 1909,” from the Mines Department, Melbourne; *Journal of Agriculture of Victoria*, vol. viii., parts 8–12, and vol. ix., part 1, from Secretary for Agriculture, Melbourne; *The Emu*, vol. x., parts 1, 2, and 3, from the Royal Australasian Ornithologists' Union; *The Geelong Naturalist*, September, 1910, from the Geelong Field

Naturalists' Club; "Records of the Geological Survey of New South Wales," vol. ix., part 1, and "Monograph of the Carboniferous and Permo-carboniferous Invertebrates of New South Wales," by R. Etheridge, jun., from the Mines Department, Sydney; "Revision of Genus *Eucalyptus*," vol. ii., part 2, by J. H. Maiden, F.L.S., from the author; *Agricultural Gazette of New South Wales*, vol. xxi., parts 8-12, and vol. xxii., part 1, from Secretary for Agriculture, Sydney; "Proceedings of the Royal Society of New South Wales," vol. xliii., parts 1-4, vol. xlv., part 1, from the Society; "Proceedings of Linnæan Society of New South Wales," vol. xxv., parts 1 and 2, from the Society; *The Australian Naturalist*, vol. ii., parts 2 and 3, from the New South Wales Field Naturalists' Club; "Proceedings of the Royal Society of Queensland," vol. xii., part 2, from the Society; *The Queensland Naturalist*, vol. i., No. 6, from the Brisbane Field Naturalists' Club; "Memoirs of the Royal Society of South Australia," vol. ii., part 12, from the Society; "Proceedings of Royal Society of Tasmania," 1909, from the Society; "Transactions and Proceedings of the New Zealand Institute," 1909, from the Institute; *The Selborne Magazine*, July to December, 1910, from the Selborne Society, London; *The Countryside Monthly*, vol. i., Nos. 1-6, from the proprietor; *Knowledge*, November and December, 1910, from the proprietor; "Memorias do Instituto Oswaldo Cruz," August, 1909, April, 1910, from the Institute.

GENERAL BUSINESS.

Mr. J. Stickland asked whether the Club's journal could not be furnished to the members at an earlier date than at present, as it frequently happened that an excursion had taken place before the details of the outing were in the hands of members. The chairman said that the committee had the matter under consideration, and hoped to be able to alter their date of meeting so as to allow of more time for the production of the *Naturalist*. The hon. editor said the delay arose principally through delay on the part of the postal officials, and that he had complained three times to the department as to the non-delivery of proofs to the printers at the proper time. He thought the only way of securing early delivery of the journal would be to adopt the president's suggestion, and hold the committee meetings a week earlier.

PAPER READ.

By Mr. F. G. A. Barnard, entitled "A Day on Mount Disappointment."

The author briefly described a short visit to a seldom-visited part of the Plenty Ranges, remarking on the physiography and

general natural history of the locality, which, however, he did not consider sufficiently interesting to repay the trouble necessary to reach the highest point of the range. An interesting capture during the outing was a specimen of the pouched or flying mouse, *Acrobates pygmæus*, Shaw, the smallest Australian marsupial, while drinking at the aqueduct, late in the afternoon.

The paper was illustrated by about a dozen lantern slides of the district, kindly lent by Mr. J. H. Harvey.

Mr. E. B. Nicholls said that on one occasion he had seen a specimen of the same animal at the Olinda Creek as early as 3 o'clock in the afternoon, though it is considered to be of nocturnal habits.

EXHIBITION OF LANTERN SLIDES.

Dr. T. S. Hall, M A., exhibited and explained a slide of a Jurassic dinosaur from Europe, and another of the claw of what is supposed to be a similar animal from the South Gippsland coalfields, the only evidence we have of such animals in Australia. Other slides illustrated geologic and scenic features of the Victorian coast in the Otway district.

Mr. A. H. E. Mattingley, C.M.Z.S., showed a number of views recently taken in the National Park, Wilson's Promontory, many of which, illustrating the animal, bird, and plant life, excited much admiration, notably those of the Koala, the Whip-Bird, the Native Heath, and the common Correa.

Mr. J. A. Kershaw, F.E.S., explained some slides of the Hopkins River and vicinity, exhibited in illustration of his paper read at the previous meeting, describing an "eel-fare" which he had recently witnessed there. The pictures had been taken under great difficulty, and demonstrated very clearly the method adopted by the young eels for ascending the falls.

Mr. Mattingley congratulated the exhibitor on the excellence of the views, considering the difficulties under which they had been taken.

NATURAL HISTORY NOTES.

Mr. G. A. Kearthland drew attention to his exhibit of a specimen of the Tabuan Crake, a Northern Territory bird, which had been picked up warm, but dead, alongside the railway line near Wallan. The bird's beak had been injured, and it had probably struck a train which had passed just before.

Professor A. J. Ewart, D.Sc., forwarded a note with reference to the use of the milky juice of an introduced euphorbiaceous plant, *Euphorbia peplus*, L., for the removal of an unsightly growth on the cheek, and suggested that the matter was worthy of further experiment under skilled observation.

Mr. A. D. Hardy, F.L.S., said the caustic property of the

juice is one of the characteristics of euphorbiaceous plants, and from the note it seemed that an introduced garden weed might be turned to some account.

Mr. J. Gabriel said that Dr. Horne, of Clifton Hill, had noticed recently that the Honey-eaters and a Sordid Wood-Swallow in his aviaries were apparently declining in condition. Investigation as to the cause showed that bees had learned to rob them of the honey supplied to them for food.

Mr. A. D. Hardy, said that, on the authority of Mr. Beuhne, president of the Victorian Apiarists' Association, the Wood-Swallow was a great bee-killer.

EXHIBITS.

By Mr. F. G. A. Barnard. — Specimen of fern, *Aspidium aculeatum*, obtained as the highest fern on Mt. Disappointment, November, 1909; specimen of Gellibrand's Hill granite, Broadmeadows excursion; and quartzite from Moonee Ponds Creek above Broadmeadows.

By Mr. C. J. Gabriel.—Marine shells dredged at Western Port—*Cymatium spengleri*, Chem., and *C. spengleri*, var. *Waterhousei*, Ad. and Ang.; also *Murex damicornis*, Hedley, obtained off Gabo Island.

By Dr. J. C. Kaufmann.—Under microscope, mite from thorax of house-fly, of a pale yellow tint, very transparent, body and legs covered with stout spines; not described or figured by Morris in his work on the house-fly.

By Mr. G. A. Kearthland.—Mounted specimen of Tabuan Crake, *Porzana tabuensis*, found near Wallan, 9th March, 1911, with clutch of eggs from Northern Territory.

By Miss Rollo.—Specimens of luminous fungus, *Pleurotus candescens*, from Broadmeadows excursion.

By Mr. J. Searle.—Specimens of *Estheria elliptica* (?) from Broadmeadows excursion, formerly known only from Western Australia.

After the usual conversazione the meeting terminated.

MR. A. O. Sayce, A.L.S., Assistant Lecturer in Bacteriology, Melbourne University, has been appointed Senior Bacteriologist in the recently established Government Bacteriological Institute of Adelaide. While congratulating Mr. Sayce on his advancement, we feel that his removal to Adelaide will leave a blank in Melbourne microscopical circles which will be hard to fill. Mr. Sayce is one of the original members of the Field Naturalists' Club, and has filled many offices, including that of president, and has contributed several important papers to its proceedings.

EXCURSION TO BROADMEADOWS.

THE excursion to Broadmeadows on Saturday, 11th March, was well attended, the president and about sixteen members and friends, including four ladies (who were not deterred by the walk of $3\frac{1}{2}$ miles from the station), being present. The day was fine, though somewhat close and oppressive, owing to the amount of moisture in the air, resulting from the recent rains, and from the same reason the fine views usually obtainable on this outing were quite spoiled. As we approached Glenroy the sides of the railway were seen to be, in places, quite blue from the wealth of flowers of the common Bluebell, *Wahlenbergia gracilis*, doubtless induced by the wonderful summer rains. Here and there the lowly convolvulus, *C. erubescens*, in varying shades of pink, was prominent enough to be picked out from the train. Those who are familiar with the portions of the North-Eastern line near town may probably wonder what there is to see around such a desolate wayside station as Broadmeadows, which seems to be situated on a bleak basaltic plateau. If they want to see the beauties of the district they must go westward for two or three miles and visit Gellibrand's Hill, easily seen from the station, standing up perhaps 250 feet above the general level of the country; but before reaching it one has to descend nearly as much into the valley of the Moonee Ponds Creek and its tributaries, so that the walk is by no means monotonously flat. Crossing a piece of open land opposite the station to reach the road, we were surprised to find several plants in bloom one would hardly expect to see at this season of the year, notably *Glycine clandestina*, a pretty little climber of the leguminous order, here trailing along the ground, sending up its racemes of delicate purplish flowers. *Convolvulus erubescens* was in all shades, from the palest to the deepest pink; and, as it seems to be hardy, and always in flower, a patch of it in a garden would look well. This part of the Broadmeadows district is geologically interesting, for, starting on the volcanic, one passes over Silurian and alluvial formations and then on to the granitic. This is first met with about a mile from the township, on the Greenvale road, and hereabouts a noticeable change in the vegetation occurs. The paddocks, which were treeless (perhaps because they had been cleared years ago) become more wooded, and as we approached Gellibrand's Hill many fine Red Gums, *Eucalyptus rostrata*, were passed. At their bases grew numerous specimens of the luminous fungus, *Pleurotus candescens*. The hill is not far from the road, and on its sides many huge bosses of grey granite stand up, in pleasing contrast to the green grass. Some attempted a short cut across a stubble field, but soon regretted it, for the recent rains had made the going very heavy. A

flock of about twenty "Galahs," or Rose-breasted Cockatoos, *Cacatua roseicapilla*, with a solitary White Cockatoo, were seen here, and it was thought to be an unusual sight to see these birds so near Melbourne.

Arrived at the hill, search was made for specimens of the two rock-ferns, *Asplenium flabellifolium* and *Cheilanthes tenuifolia*, which are usually to be found there, and the search was not in vain. The rocks were ascended, but the view was not equal to that obtained on a previous visit, the You Yangs, 35 miles away, being almost the limit of the outlook. Of Melbourne, only 15 miles, it was too hazy to make out any leading features. On the previous excursion, the Barrabool Hills, beyond Geelong, 60 miles away, could be made out. The granite outcrop extends for about two miles north-westerly across the Greenvale Sanatorium Reserve into the Woodlands estate. Just across the latter boundary there is a very interesting granite tor. A somewhat spherical block of granite, having a diameter of about nine feet in either direction, rests on a much smaller base, about four feet high, forming a very conspicuous and curious object. For the benefit of those who may wish to visit it, it may be mentioned that it is situated about 500 yards south of the road from Greenvale to Inverness, and about 100 yards inside the Woodlands boundary. An attempt was made to capture a fine lizard seen sunning itself on a rock, but it disappeared into a fissure too quickly.

Having spent as much time as we dared wandering round the outcropping rocks, we returned to the station by our outward route. Few insects were seen, two or three common species of Orthoptera (Locustidæ) being the most noticeable. A very fine specimen of the Australian Admiral butterfly, probably just emerged, was flitting about the summit of the hill, which, by the way, is probably about 650 feet above sea level. Some good specimens of the white-flowered ironbark, *Eucalyptus leucoxylon*, were noted on the granite country. One of the party, Mr. J. Searle, devoted himself to pond life, and reports as follows:—"Most of the pools visited on Saturday were conspicuous by the absence of Entomostraca, the first and last being exceptions. In the first, on the road to the township, two species of Boeckella and two or three of Cyclops were fairly numerous, while the last pool, at the foot of Gellibrand's Hill, fairly teemed with *Daphnia carinata*. The most interesting find was specimens of an Estheria, which agree very closely with *E. elliptica* of Sars. Should it prove to be this species, I think Prof. Sars's specimen, raised from dried mud, is the only other record of the species. A few rotifers, stentors, vorticella, &c., were noted."

On returning to the station, the members were taken by

PLATE XIX.



BEES IN THE OPEN, NEAR SALE.

Photo. by H. B. WILLIAMSON.

surprise by finding afternoon tea set out for them through the thoughtfulness of Mr. and Mrs. Wisewould, to whom the thanks of the members were expressed ere the party returned to town by the 7 p.m. train.—F. G. A. BARNARD.

BEES IN THE OPEN.—In a forest of *Banksia serrata*, two miles inland from the Ninety-Mile Beach at Lake Reeves, Gippsland, I came upon a "camp-out" of bees. From a sloping trunk of a *Banksia*, 10 feet from the ground, hung four fine sheets of comb, about 2 feet 6 inches long, in possession of a small colony of bees, evidently reduced in numbers by swarming. I could just make out some sealed brood on one of the centre combs. From the dark appearance of the comb, I should say that the bees had wintered there—a real winter "camp-out." The unusual occurrence may be accounted for by a coincidence of circumstances—(1) absence of hollows in the banksias; (2) the mildness of the weather; (3) the presence of a laying queen at swarming time; (4) the abundance of honey. The swarm, being full of nectar, and wax secretion going on so fast that the bees hanging in a cluster waiting so long for scouts to bring news of a suitable hollow get a piece of comb built, in which the queen, in full laying trim, deposits some eggs. These hatch in three days, and make the bees feel interested in the spot. The weather continuing mild, and a fine honey flow keeping up, the colony gets firmly established. That it came safely through the winter is not so remarkable. They must have had a good stock of food, and the cluster, being reduced well away from the edges of the comb (which, of course, is a bad conductor of heat), heat was conserved until a mild spring allowed them to forage for nectar and pollen. The four sheets of comb extended downwards from a first-rate roof of wax, so that rain could not get into the cluster from above. I think that they have a good chance of wintering there another season. Information from a friend of mine living 12 miles away, at Dutson, and often passing the spot on his way to the beach, will be sought concerning the future of the "camp-out."—H. B. WILLIAMSON, Geelong.

STRANDED WHALES IN BASS STRAIT.—The *Australasian* of 11th March contains a number of illustrations of the remarkable sight occasioned by the stranding of thirty-seven sperm whales on Perkins Island, near Duck River, Tasmania. They consisted of thirty-six bulls and one cow, and their length averaged about 50 feet. The occurrence seems to be a record. The animals are being turned to commercial purposes as quickly as possible.

A DAY ON MOUNT DISAPPOINTMENT.

BY F. G. A. BARNARD.

(Read before the Field Naturalists' Club of Victoria, 13th March, 1911.)

NOTWITHSTANDING the somewhat ominous name of the highest point of the Hume Range (as that part of the main Dividing Range about the sources of the Plenty River is officially called), I had long wanted to set foot on the historic spot from whence, nearly ninety years before, those adventurous spirits Hume and Hovell, the first white men to tread its forest slopes, had vainly sought signs of the sea on the distant horizon. On suggesting the trip to two of our members, Messrs. D. Best and C. French, jun., they readily agreed to share in the attempt. I may say at the outset that I was not satisfied with the results of the Club excursion to the Plenty watershed in November, 1908 (*Vict. Nat.*, Dec., 1908, vol. xxv., p. 130), as on that occasion we did not really get on to the granite formation, which occupies at least half of the Toorourrong basin, and on which I had great hopes of finding a more interesting fauna and flora than met with during the excursion.

As our outing was somewhat of a disappointment, a few notes about the day's adventures may, perhaps, be of use to other members who may be seized with the wish to set foot on the summit of the Plenty Ranges.

Whittlesea was, of course, our base, and, so as to have plenty of time for our exploration, we went up by the evening train on the previous day, and, securing accommodation at the local coffee palace, were promised breakfast as early as we wished on the morrow. Consequently, 7.30 a.m. saw us setting out for Toorourrong, for, though by the maps Mt. Disappointment is due north of Whittlesea, and distant just six miles, one has to make a detour to the east, in order to take advantage of a spur which leads up from the south-west corner of the reservoir, thus adding at least two miles to the journey. The path along the aqueduct is the pleasantest way of getting to Toorourrong, but we found the bridge over the Scrubby Creek so barricaded with barbed wire that it was necessary to make a detour to the bridge on the Yea road. Striking across the paddocks, we soon got back to the aqueduct enclosure, which was entered near the syphon. Here the sharp eyes of Mr. French detected a rust (a micro-fungus) on the Kangaroo Grass, *Anthistinia ciliata*; and, as this was a desideratum Mr. McAlpine had urged him to be on the look-out for, specimens were eagerly gathered, and placed in envelopes for future examination. It was rather disappointing to learn a few days later that the species, *Cintractia exserta*, McAlp., would have been new to science had it not been sent in a short time

before from a locality in the north-eastern portion of the State. *Pimelea curviflora* was growing on the bank hard by, noticeable from the waxy appearance of the flowers, and their somewhat unpleasant smell when crushed. As we journeyed along the aqueduct other rusts were secured on grasses, lucerne, &c. The composite *Erechtites* grew abundantly hereabouts, and, being the principal food plant of the larvæ of the Australian Admiral butterfly, *Pyrameis itea*, beautiful specimens of that insect were flying about, and a few larvæ found on making a search.

The basin of the eastern Plenty, with its encircling hills, was now in view, and speculations were indulged in as to the whereabouts of our objective, the solving of which was the problem in hand. The early morning effects seemed quite as enchanting as those seen at the close of the day, and those who have not yet seen this beauty spot have a treat in store. Following the embankment of the reservoir, we crossed the bye-wash, and immediately struck up the steep spur which terminates abruptly there. From the examination of maps, I had learned that the crest of this spur formed the boundary of the water reserve, and had been informed that it led right up to Mt. Disappointment, or Scaffold Hill, as it is locally called. We soon found signs of an old road used in the paling-splitting days, and, later, the boundary fence of the reserve. This we thought it would be prudent to follow, but little did we think it would be our friend and guide for the rest of the trip.

Bearing north-westerly through a stunted growth of young gum saplings struggling to grow in the hard, parched soil along with young *Cassinias* (Compositæ), &c., our fence led us gradually upwards, and in an hour's time we found ourselves faced with the ascent of One-Tree Hill, marked "Cleared Hill" on the Geological Survey map (3 N.E.) This is a prominent object from Whittlesea; but, instead of being a cleared or a "one-tree" hill, it is now covered with a dense growth of tall, straight, fairly young trees, through the centre of which a slight break seemed to run. This was our fence. Should we follow it, or should we go round through the scrub? We determined to stick to our guide, and, taking the abrupt rise in easy stages, reached the top, perhaps 500 feet above the lake below. The day was rather hazy, but by means of the field-glass we were able to pick out the well-known "Pinemont" at Ringwood, some 25 miles away. The Yan Yean itself, and the lower country, was spread out like a map, and, though we could not make out any of the prominent objects of Melbourne, we felt that we had already got some return for our trouble.

The descent on the other side was of short duration, and

just at the foot we passed through a line of charred fencing, which marks the boundary between the parishes of Toorourrong and Wallan Wallan. Henceforward, our fence marked the boundary between the Metropolitan Board's reserves and the State forest.

Hereabouts the vegetation became more interesting. We were getting near the boundary of the Silurian and the granite. Grass-trees became noticeable features of the landscape. The young growth of *Lomatia ilicifolia* was very pretty. Another proteaceous plant, *Grevillea repens*, a prostrate form with leaves similar to those of the *Lomatia*, was growing close by. The tea-tree, *Leptospermum scoparium*, was in bloom, but not a beetle frequented it. The beautiful Fringed Lily, *Thysanotus tuberosus*, was frequent. Some fine specimens of the Mountain Brown Butterfly, *Epinephile abeone*, were flitting about, together with *Pyrameis Kershawi*, *P. itea*, and an occasional white, *Belenois java*. The sentries of a flock of White Cockatoos became alarmed at our presence, and soon had the whole neighbourhood alive with their screams and those of their companions. Gang-gangs also were noticeable by their cries. Our track now turned almost due north, and led through a moderate growth of bracken. Again one of the old timber tracks of bygone days crossed our path. The ascent became steeper, and presently stray pieces of granite appeared, to be followed shortly by larger exposures on either hand. We had still a mile and a half to go. The bracken became thicker, and our progress was slow, for occasionally a fallen tree encumbered our way, and the fence had to be crossed and re-crossed.

A fine growth of *Senecio lautus* had a peculiar appearance, which arrested our attention for a while. Investigation showed that the heads of unexpanded flowers were infested with aphids, which were causing an exudation of a resinous nature, resembling coarse sugar. The hemipterous insect *Nysius vinitor*, known as the Rutherglen fly-pest, was also present in great numbers, and these were so depriving the stems of the plants of their juices that many of the heads of flowers were drooping over from the effects of the suction; but the most interesting feature of all was that there was an example of every disease having its cure, for the lady-birds, *Leis conformis* and *Orcus australasica*, were present in dozens, no doubt helping to keep in check the myriads of aphides. Specimens of this interesting case of life upon life were secured for future investigation.

We were gradually getting higher, but our outlook was limited, owing to the growth of trees and scrub; but we were disappointed at the size of the trees. Nowhere did we see any worth measuring. Here and there a few tree-ferns, *Alsophila australis*, appeared through the scrub; but presently, in a

depression on our right, were the heads of a fern gully, so we decided to make for it, as our climb, so far, had been a "dry" one. A little stream of cold water trickled down amid King and other ferns, and afforded a welcome drink. Then came the struggle back through the bracken and burnt scrub to our friendly fence. The bracken became taller, and, when separated by only a few yards, it was only possible to see one another's hats. Our coats became brown from the quantity of fern spores shaken on to them. All through the bracken on the dry hillside it was remarkable to notice a short growth of the fern *Lomaria discolor*, usually associated with running streams. At length the top of the range seemed to be in view, and soon after mid-day we reached a granite-topped hill, which proved to be the veritable Mount Disappointment. Our fence, which we had not expected to last so long, now turned eastwards, signifying that we were on the summit of that part of the Dividing Range, 2,617 feet above sea level, and 1,815 feet above Whittlesea, our starting-point five hours before.

Few signs of the trigonometrical station remain. The wooden tower was burned down years ago; but signs of where the legs of it were built around with stones still remain. We selected the centremost rock for our resting-place, and quietly munched our luncheons, drinking in the pure mountain air, with the whole country below us. Unfortunately, the haze over Melbourne still persisted, so the city was invisible. The dim outlines of the Dandenongs were visible, also the bold front of Macedon in the other direction. Nearer at hand we looked down on the little township of Wandong, with Mount William at Lancefield beyond. More northerly was the curious sugarloaf peak of Mount Piper, near Broadford, with range beyond range round towards Wallaby Creek.

The locality was too rough for much rambling, and had it not been for our friend and guide I feel sure we would not have reached our goal. Whether we were on the spot trodden by Hume and Hovell in 1824 matters not. It is more than probable they did not penetrate to the highest portion of the range, and it is quite probable that the portion to the eastward, sometimes known as "Yorktown," is not many feet lower. However, as it is, the country is too rough for hurried collecting, and so far we had little reward in that way for our climb.

In a slight hollow a few hundred yards eastward of the trigonometrical station was a fine growth of Musk, *Hedycarya*, *Senecio Bedfordi*, &c., and, if one were not afraid of getting one's clothes torn to ribbons, it might be possible to find something interesting: but I doubt it, and therefore advise naturalists to give this part of the Plenty Ranges a wide berth.

After about an hour on the top of the mountain we turned

homewards, though not before securing the highest situated specimen of *Aspidium aculeatum* as a reminder of our visit. We naturally found the descent a great deal easier, and turned off again at the spring for a welcome drink, as the day was warm and the luncheons rather dry. Before leaving, a few small specimens of *Osmunda barbara*, *Lomaria capensis*, and *Pteris incisa* were secured as mementoes of our visit. Higher up, *Asplenium flabellifolium* and *Aspidium aculeatum* had been seen among the rocks. A beautiful pair of King Parrots, *Aprosmictus cyanopygius*, for which these ranges are noted, was disturbed from a log.

When we got back to the grass-trees we sat down a while to rest, when some of Dr. Hall's remarks in his paper, "Ungarnered Grain," came to our minds, and the following queries suggested themselves as requiring solution. Why were all the grass-trees around us in the same stage? All had flower stems two or three years old, not one showing signs of a new season's growth. Does a grass-tree flower more than once? Is the statement correct that they require to be scorched by a bush fire in order to induce flowering? Who will answer these simple questions? Again, seeing that this country has been burned so often, and is so rough to booted feet, how did the barefooted aborigines manage to get about in it? Prof. Ewart's remarks in the introduction to his work on "The Weeds, &c., of Victoria" were brought home to us at seeing the thoroughly burnt-out appearance of the soil round about—barely any evidences of humus left. Animal life of every sort was almost absent, though signs of wombats were occasionally seen.

On reaching the Cleared Hill, to save going over it we took a bridle track which we noticed on our left, which led us round the hill, and so saved a good climb. This revealed to us one of the finest sights of the day—the basin of Toorourrong as a sea of tree-tops. Straight in front of us was Cleeland's Hill, and the saddle over which the Club passed in November, 1908. Further ahead was the high hill overlooking the cascades. The tops of Mounts St. Leonard (near Toolangi) and Monda (near Healesville) just showed over the Sugarloaf Range, while "Howat's Look-out" and the Yan Yean completed the notable sights.

The track led us back to the fence, and in half an hour we were down again at the lake-side finishing our luncheons. We had an hour before we need set out for Whittlesea, so a short stroll was taken along the final part of the Jack's Creek aqueduct. Here we made one of the most remarkable captures of the day, for which Mr. French's sharp eyes were again responsible. He called attention to a mouse-like creature walking up the pitchers of the channel, and, quickly crossing a foot-bridge which was handy, caught the animal as it ran into a

grass tussock. It proved to be a specimen of our smallest marsupial, *Acrobates pygmaeus*, the so-called "flying mouse," remarkable for its feather-like tail. It was quickly transferred to the collecting bottle, as being of value at the National Museum. I felt sorry for the poor little creature in happening to go for a drink at such an unlucky moment, as these animals are said to be nocturnal in their habits. It had ventured out rather early that evening, for it was then barely five o'clock.

We now turned homewards, and, excepting the excitement of seeing a Brown Snake at Syphon Hill, which was too quick for us, and got away in the long grass, we reached Whittlesea about half-past six. I am still dissatisfied with the natural history of the Toorourrong basin, and hope, at no distant date, to try the head waters of the Eastern Plenty, when possibly I may have something of greater novelty to record.

BOOK NOTICES.

A GUIDE TO THE NATURAL HISTORY OF THE ISLE OF WIGHT.

Edited by Frank Morey, F.L.S. London: W. Wesley and Son. 560 pp. (8½ x 5¼), with map and about 30 illustrations, diagrams, &c. 10s. 6d.

THE editor, in an interesting introduction of about 20 pages, relates how the idea of a complete guide to the natural history of the island grew upon him, and how he set to work to secure the assistance of specialists and enthusiasts in the different branches of science. He points out what numbers of different forms of animal or vegetable life must exist in any given area, and how little is known about them. He has something to say on the question of our right to collect and preserve specimens of natural history, maintaining that, in the majority of groups, the average collector does little or no harm by the few specimens he manages to secure out of the many thousands by which he is surrounded. But it is to the general plan of the work attention is directed. The Isle of Wight is a well-known part of England, situated off the middle of the southern coast, in close proximity to Bournemouth, celebrated as a health resort on account of its genial climate, and not far from that entomologists' paradise, the New Forest. The Solent and Spithead, separating it from the mainland, are comparatively shallow, and only from three to six miles in width. The island covers about 93,000 acres—slightly smaller than our Wilson's Promontory National Park—and in form is somewhat lozenge-shaped, with a coast-line of about 60 miles, the longest axis (about 20 miles) being from east to west, while from north to south, at the widest part, is about 13 miles. The country is undulating, averaging about 200 feet above sea level; there are, however, two or three elevations of 450 feet, and one of 667 feet.

There is still a fair amount of wooded country, with open downs and marshy tracts, so that all varieties of life are provided for ; and last, but not least, the geological formations between "Recent" and "Lower Cretaceous" number no less than twenty-eight. With these characteristics the island forms an ideal territory for treatment on Mr. Morey's plan. After an outline of the geology, chapters are devoted to earthquakes and palæolithic implements. Then the vegetable kingdom is dealt with in the ascending order in seven chapters, commencing with the fungi, next the algæ, and so on to the flowering plants and ferns. Thirty chapters, or sections, are necessary for the animal kingdom, commencing with the protozoa and concluding with the mammals. In each section, besides complete lists of species in systematic order, with localities and other particulars, many interesting notes, with plates of the rarer specimens, are included. References to the standard text-books and writers on the subject are given, which are not without value to a student in the Southern Hemisphere. Some idea of the extent of the fauna and flora may be gained from the editor's summary of the species recorded, numbering 6,982. The numbers of a few well-known groups may be quoted :—Fungi, 443 ; marine algæ, 216 ; flowering plants and ferns, 1,032 ; mollusca, 140 ; arachnida (spiders), 153 ; hymenoptera, 472 ; coleoptera (beetles), 1,434 ; butterflies and moths, 972 ; fishes, 120 ; birds, 248 ; and mammals, 42. Some account of the meteorology of the island is also given, from which it may be gleaned that the average rainfall is $27\frac{1}{2}$ inches ; number of wet days, 162 ; number of sunless days, 60 ; highest shade temperature, 86° ; lowest, 14° . The volume is an excellent example of what might be attempted, if not for Victoria, then for, say, the county of Bourke, and in its accomplishment would set a definite goal before many members of the Field Naturalists' Club, who at present seem to be in want of something to inspire their work. The county of Bourke would not, in some respects, compare with the Isle of Wight, as its area is nearly twelve times greater, and its elevation above sea level differs to a much greater extent, reaching in one or two places to about 3,000 feet, while its shore-line is that of a comparatively enclosed bay, though the latter is of considerable size. The book, however, is one that is well worth the attention of all nature-lovers.

PEBBLES. By E. J. Dunn, F.G.S., Director of the Geological Survey of Victoria. Melbourne : G. Robertson and Co. Ltd. 122 pp. ($5\frac{1}{2} \times 8\frac{1}{2}$), with 76 plates, containing 250 figures. 15s.

It is not often one comes across a scientific or semi-scientific work with so brief a title, and apparently requiring so little

explanation as to what it is about. In an equally brief preface the author says that for more than half a century he has been collecting in various countries the material which he has now figured and made available to the general reader, for, after all, the book is not an intricate treatise on geology, but rather a popular explanatory catalogue of objects of Nature's manufacture. In 1905 Mr. Dunn was awarded the Murchison medal of the Geological Society of London, and he has applied the portion of the fund accompanying the medal towards the production of the work under notice. The definition of a pebble is somewhat difficult, but the author restricts himself to stones or other material from less than six inches in their longest diameter down to stones the size of a pea. The variety of forms assumed is naturally very great, and results from the different materials of which pebbles may be formed, and from the agencies concerned in their making: thus, heat and cold, wind, water, ice, volcanic action, and other circumstances may have had a hand in the formation of a pebble, and one can quite understand with what interest an enthusiast would pick up a pebble and turn it over and over, and try to imagine its life-history, if such a term may be used. A single stone may represent the work of several agencies. Thus, a certain pebble from the bank of the Orange River, South Africa, if it could speak, would reveal a story somewhat as follows:—Originally a piece of ancient amygdaloid rock of igneous origin, it was rounded by flowing water. Later, a chip was broken off it by glacial action, which also scored and scratched its surface, partly obliterating the sharp edges where the chipping had taken place, but leaving as projections the harder portions, composed of jasper and quartz. Then, when lying in a river-bed, a deposition of other material took place, the river changed its course, it became portion of the Dwyka conglomerate, only to be again released by denudation, and left among its fellows in the Orange River, to be picked up by a Bushman and used as a hammer, finally becoming the plaything of a Dutch boy.

The plates have been splendidly executed and printed by the D. W. Paterson Co., and, taken merely as typical examples, show what an interesting collection (a collection no museum beetle will destroy) the author must have made during his travels all over Australia, New Zealand, South Africa, Great Britain, &c. The descriptive list of the illustrations adds many details to those already given in the text. Naturally, Victoria offers many examples for figuring, and those who are anxious to take up the study will find numerous specimens in the creeks and gullies of the north-eastern portion of the State; or, nearer home, the ballast used for the railway line between

Launching Place and Warburton will afford a great variety of stones, often banded with thin quartz veins. Again, at the Djerriwarrh Creek, between Melton and Bacchus Marsh, Silurian stones of infinite variety may be collected (*Vict. Nat.*, xxiv., p. 127). The author is to be thanked for directing attention to such apparently trivial objects as pebbles, and showing how every production of Nature can reveal a story if one is clever enough to interpret it.

CORRESPONDENCE.

RE "AUSTRALIAN PLANTS," BY W. R. GUILFOYLE.

To the Editor of the Victorian Naturalist.

SIR,—I should be glad if you would allow me to say, in regard to your review of the above book in your last issue, that, as one who was officially connected with the author during the whole of his curatorship of the Melbourne Botanic Gardens, and also as a member of the Plant Names Committee of the Field Naturalists' Club of Victoria, I have no sympathy whatever with that portion of the review which relates to the committee mentioned. Mr. Guilfoyle was under no obligation to acknowledge the committee's work, however valuable it was. On the other hand, he assisted the committee, from time to time, by furnishing it with lists of common names of Victorian plants which had been collected at the Gardens during his curatorship.—Thanking you in anticipation, I am, Sir, yours truly,

F. PITCHER.

Botanic Gardens, 27th February, 1911.

[The words "failed to acknowledge" in the review in question (line 3, page 203) were used in the sense of "failed to refer to," and not with any implication that the work of the Plant Names Committee had in any way been made use of by the author without acknowledgment.—ED. *Vict. Nat.*]

WE regret to record the death of Mr. F. M. Reader, of Dimboola, a well-known botanist and collector. He was a good authority on the grasses of the southern Wimmera, describing several new species in these pages. When a resident of Melbourne he commenced a flora of Studley Park (*Vict. Nat.*, vol. i., p. 172 *et seq.*), but owing to his removal to the country it was not completed. His collections, which were very extensive, were acquired by the National Herbarium a little time ago.

THE
Field Naturalists' Club of Victoria.

(FOUNDED MAY, 1880).

❖ MEMBERS, ❖

31st MARCH, 1911

(With Date of Election and particulars of Branch of Study).

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- Oct. 1885 † ATKINSON, E. D., C.E., F.R.G.S., Tasmania.
July 1883 BROUN, CAPTAIN T., Howick, N.Z.
Aug. 1884 COX, DR. J. C., F.L.S., C.M.Z.S., Sydney, N.S.W.
Aug. 1884 FINSCH, DR. OTTO, Germany.
Sep. 1889 † LEGGE, LIEUT.-COL. W. V., R.A., F.Z.S., M.B.O.U.,
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Feb. 1893 * † LUCAS, A. H. S., M.A., B.Sc., Grammar School, Sydney,
N.S.W.
Aug. 1882 RAMSAY, DR. E. P., F.R.S.E., &c., Sydney, N.S.W.

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- Sep. 1884 BAGE, MRS. EDWARD, "Cranford," Fulton-street, E. St. Kilda.
Sep. 1882 PATEY, B. R., ESQ., Premier Buildings, Collins-street, M.

ORDINARY MEMBERS.

- June 1910 Abbott, S. B., Mines Department, Bendigo
Aug. 1907 Anderson, G., 32 Park Hill-road, Kew ... Ornithology
Aug. 1885 Andrews, H., 206-208 Flinders-lane, Melbourne
Oct. 1909 Anjou, Hy., Neerim-road, Murrumbena
Aug. 1906 Armitage, Jas. A., 510 Station-street, N. Carlton
April 1906 * † Armitage, R. W., B.Sc., 441 Canning-street,
Carlton Biology, Geol.
June 1906 † Audas, J. W., National Herbarium, S.Y. ... Botany

- Feb. 1904 † Bage, Miss F., M.Sc., "Cranford," Fulton-st.,
St. Kilda ... General Biol.
- June 1906 Bainbridge, J. W., Crown Lands Dept., M. ... Botany
- Aug. 1889 † Baker, H. H., 78 Swanston-street, Melbourne Microscopy
- May 1880 o Bale, W. M., F.R.M.S., Walpole-street, Kew Hydroids
- May 1880 o Barnard, F., "Bracondale," Foley-street, Kew
- May 1880 o * † Barnard, F. G. A., 49 High-street, Kew Ent., Bot. (Ferns)
- Jan. 1906 Barnett, Miss A. M., P.O., Newport
- Dec. 1909 Barr, Jas., 39 Queen-street, Melbourne
- Sept. 1899 * † Barrett, C. L., *Herald* Office, Melbourne ... Orn. & Reptilia
- May 1906 Bennett, W. J., "Riverside," Davidson-st., South Yarra
- Dec. 1907 Bennetts, W. R., Pakington-street, Kew ... Pond Life
- May 1880 o * † Best, D., 291 Little Collins-street, M. ... Ent. (Col.)
- Nov. 1900 † Billingham, F. L., National Bank, Bacchus
Marsh ... Ent. (Col.)
- Nov. 1904 Booth, J., "Orwilda Ruma," 25 Rathdown-st.,
Carlton ... Amphibia
- May 1905 Booth, Miss D. E. H., 25 Rathdown-st., Carlton
- May 1905 Booth, Miss E. S., "Oakover," Bell-st., S. Preston
- Dec. 1909 Bury, Miss E., "Verona," Argyle-street, St. Kilda
- Dec. 1906 † Campbell, A. G., "Fernside Orchard," Pomonal,
via Stawell ... Orn., Oology
- Mar. 1909 † Carter, T., M.B.O.U., Broome Hill, W. Aust. Ornithology
- Mar. 1907 Catron, Jos., State School, Charlton
- Dec. 1902 Cayley, F. J., Werribee
- May 1902 † Chapman, F., A.L.S., F.R.M.S., Nat. Museum,
Melbourne ... Geol., Palæon.
- July 1902 Clark, Alister, "Glenara," Bulla ... Ornithology
- Dec. 1908 Clarke, A. Rutter, Orrong-road, Toorak
- Mar. 1889 Cochrane, Miss S. W. L., 11 Morang-road,
Hawthorn ... Botany
- July 1882 * Coghill, G., 79 Swanston-street, Melbourne Botany
- Nov. 1906 † Cole, C. F., 28 Currajong-road, Auburn ... Ornithology
- Nov. 1902 Cowle, Miss L., c/o Mr. Priest, Devonport W.,
Tasmania
- Feb. 1910 Crawford, Miss K., 32 Motherwell-st., Hawksburn
- Dec. 1910 Cronin, John, Botanic Gardens, Melbourne
- Aug. 1905 Cudmore, Mrs., "Springfield," Murphy-st., S. Y.
- Feb. 1901 D'Alton, St. Eloy, C.E., Dimboola ... Botany
- Dec. 1892 Danks, A. T., Bourke-street, Melbourne
- July 1902 Davey, H. W., Clarence-street, Geelong West
- June 1909 Davis, Miss M., 337 Weston-street, Brunswick
- Nov. 1905 Dawes, Capt. R. J., 76 Morris-st., Williamstown
- May 1910 Deasey, Miss H., Laluma, Brighton-rd., Elsternwick
- Nov. 1910 Douglass, Miss A., Mona-place, South Yarra
- May 1880 o * Dixon, J. E., 50 Swan-street, Richmond Ent. (Col. & Lep.)
- May 1904 Edmondson, C. H., 75 Riversdale-rd., Hawthorn
- Dec. 1901 Edmondson, Mrs. C. H., Riversdale-rd., Hawthorn
- Dec. 1909 Eltis, R. H. M., Livingstone-street, Ivanhoe
- April 1906 * † Ewart, Professor A. J., D.Sc., Ph.D., F.L.S.,
National Herbarium, South Yarra ... Botany
- May 1910 Farmer, Mrs. H. H., Vermont
- Sept. 1907 Farr, W. H., Flinders
- May 1890 * † Fielder, Rev. W., F.R.M.S., "Croft," Orrong-
road, Armadale ... Micro. Biology
- May 1880 o * † French, C., F.E.S., Department of Agricul-
ture, Entomological Branch, M. ... Entomology
- July 1883 * † French, C., jun., Department of Agriculture,
Entomological Branch, Melbourne ... Entomology
- Aug. 1885 * † Frost, C., F.L.S., Scott-street, Canterbury ... Reptilia

- Mar. 1901 Fullard, A. F., Barker's-road, Hawthorn
 July 1883 *† Gabriel, J., Walmer-street, Kew ... Oology
 June 1900 † Gabriel, C. J., 293 Victoria-st., Abbotsford .. Marine Conc.
 July 1908 Gabriel, J. E., Sale
 Nov. 1889 Gates, W. F., M.A., "Cullymont," Selwyn-rd.,
 Canterbury
 Oct. 1880 *† Gatliff, J. H., Morrah-street, Parkville ... Marine Conc.
 Aug. 1910 Gill, Miss E. C., Bank-street, Box Hill
 April 1909 Gillbanks, Miss G., Normanby-st., M. Ponds
 Aug. 1907 Goodson, W. E., State School, Doncaster
 June 1902 † Goudie, D., Sea Lake, Victoria ... Ent. (Lep.)
 May 1902 † Goudie, J. C., Sea Lake, Victoria ... Ornith., Ent.
 Dec. 1906 Gray, O., Wedderburn, Victoria
 Dec. 1909 Greenwood, Rev. A. J., Smythesdale
 Jan. 1901 Greenwood, G. F., "Garrell," Glen Eira-rd, Caul.
 July 1909 *† Haase, J. F., 367A Little Collins-st., M. ... Entomology
 June 1910 Haig, H. G., Nicholson-street, Fitzroy
 June 1888 *† Hall, T. S., M.A., D.Sc., University, Carlton Gen. Bio., Geo.
 (Grapt.)
 Dec. 1905 *Hamilton, Jas. T., F.L.S., Heidelberg-rd., Ivanhoe Bot., Geol.
 Sept. 1887 Hammet, E. R., State School, Loch
 Sept. 1909 Handley, Edgar, 74 Park-st., North Fitzroy
 Nov. 1901 *† Hardy, A. D., F.L.S., F.R.M.S., Forests } Bot. (Freshwtr.
 Dept., Melbourne ... } Algæ
 Aug. 1887 † Hart, T. S., M.A., School of Mines, Ballarat Geology, Bot.
 July 1899 Hartnell, W. A., "Irrewarra," Burke-road,
 Camberwell
 Dec. 1905 *† Harvey, J. H., A.R.I.V.A., 128 Powlett-st.,
 East Melbourne
 June 1910 Helm, Otto, State School, Laver's Hill
 May 1910 Henderson, Miss J. I., "Glenelg," St. George's-
 road, Elsternwick
 Jan. 1884 * Hill, G. R., "Glenrowan," Parkside-st., Malvern
 Aug. 1909 Hill, G. F., Parkside-street, Malvern ... Ornithology
 April 1901 † Hill, J. A., Kewell, *via* Murtoa ... Ent., Orn.
 Sept. 1910 Hill, Miss T., Beaconsfield-parade, Albert Park
 Mar. 1907 Horner, Miss L., State School, Castlemaine
 Sept. 1910 Ingle, Daniel, Healesville
 Feb. 1909 Jardine, B. A. L., Clermont, Queensland ... Ornithology
 April 1909 † Jarvis, E., Dept. Agriculture, Brisbane ... Entomology
 Jan. 1905 Jeffery, H. W., "Hazeldene," Cochrane-street,
 N. Brighton
 June 1910 Johnstone, J., State Plantation, Creswick ... Botany
 Nov. 1907 Johnson, H., 36 Rouse-street, Port Melbourne
 April 1905 † Jutson, J. T., "Oakworth," Smith-st., Northcote Geology
 April 1904 Kaufmann, J. C., LL.D., 21 Kooyongkoot-road,
 Hawthorn ... Pond Life, Mic.
 Feb. 1886 *† Kearthland, G. A., Age Office, Collins-street, M. Ornith., Oology
 Feb. 1907 Kellock, C. F., Sloyd Centre, Castlemaine
 July 1908 Kelly, Reginald, Healesville ... Botany
 Nov. 1905 Kendall, H., 14 Rathmines-grove, Auburn
 Feb. 1906 Keppel, Miss K., Marysville
 Mar. 1888 *† Kershaw, J. A., F.E.S., National Museum, M. Zoology.
 July 1893 † Kitson, A. E., F.G.S., c/o J. S. Kitson, Con-
 tinuation School, Melbourne ... Geology
 June 1903 Kitson, J. S., Continuation School, Melbourne ... Geology
 Sept. 1908 Lazarus, Miss M., M'Kean-street, North Fitzroy
 Dec. 1902 *† Leach, J. A., M.Sc., Education Dept., M. ... Biology, Geol.
 Sept. 1907 Leach, Mrs. J. A., 48 Leopold-street, S. Yarra
 May 1903 Lees, E. H., C.E., F.R.A.S., Fairhaven, Mallacoota

- Oct. 1905 *† Le Souëf, D., C.M.Z.S., Royal Park,
Parkville ... Ornith., Oology
- Aug. 1907 Lindsay, J., State School, Wannon
- Oct. 1907 Littlejohn, W. S., M.A., Scotch College, M.
- Feb. 1902 Luly, W. H., Spring-street, Preston
- Aug. 1910 Luxton, T., jun., 46 Claremont-avenue, Malvern
- April 1888 † Lyell, G., jun., F.E.S., Gisborne ... Ent. (Lep.)
- June 1887 *† Macgillivray, Dr. W., Broken Hill, N.S.W. Ornith., Oology
- Jan. 1907 Mackeddrie, Dr. J. F., Collins-street, Melbourne
- Dec. 1902 † Madden, Hon. F., M.L.A., Studley Park, Kew
- Jan. 1908 † Mahony, D. J., M.Sc., Dept. of Mines, M. ... Geology
- Nov. 1904 † Maplestone, C. M., Eltham ... Polyzoa (recent,
fossil)
- Nov. 1895 *† Mattingley, A. H. E., C.M.Z.S., Barrington-
avenue, Kew ... Ornithology
- Sept. 1908 Mattingley, Mrs. A. H. E., Kew
- May 1885 † McAlpine, D., Department of Agriculture, M. Botany
- July 1894 * McCaw, W. J., 7 Liddiard-street, Glenferrie ... Zoology
- May 1910 McLennan, C. M., "Yanakie," *via* Foster
- June 1904 * McLennan, J. P., 34 The Parade, Ascot Vale ... Botany
- Jan. 1904 McMahon, W. Hugh, Liebig-street, Warnambool
- Aug. 1899 McNab, L. K., "Braeside," Waiora-rd., Caulfield
- Dec. 1910 Mesley, A., 207 Royal-parade, Parkville
- June 1904 Montgomery, Miss M. H., State Schl., Clifton Hill
- July 1899 Morgan, W. J., 11 Robb-street, Essendon
- Nov. 1884 Morrison, Dr. A., Rokeby-road, Subiaco, Perth,
W.A. ... Botany
- Oct. 1895 Mowling, G., "Athol," Auburn-road, Hawthorn
- April 1903 † Nicholls, E. B., 164 Victoria-st., North M. ... Ornithology
- May 1880 o† North, A. J., C.M.Z.S., Australian Museum,
Sydney, N.S.W. ... Ornithology
- Dec. 1908 † O'Donoghue, J. G., City-road, S. Melbourne ... Ornithology
- Dec. 1904 Oke, Chas., 56 Chaucer-street, St. Kilda ... Entomology
- May 1902 O'Neil, W. J., Department of Lands, Melbourne
- Mar. 1910 Petherick, E. J., F.L.S., F.R.G.S., 254 Albert-
street, East Melbourne
- May 1880 o*† Pitcher, F., Botanical Gardens, Melbourne ... Botany
- Jan. 1909 Plumridge, C. L., Peel-street, Kew ... Botany
- Sept. 1901 † Pritchard, G. B., D.Sc., F.G.S., 22 Mantell-
street, Moonee Ponds ... Geology, Conc.
- May 1892 Quiney, H., Mortlake ... Ornithology
- May 1909 Raff, Miss J., M.Sc., 86 Fitzgibbon-st., Parkville Botany
- May 1905 Randall, Miss M., "Litchfield," Primrose-street,
Essendon
- April 1909 Ritchie, Miss E. M., Hotham-st., Balaclava
- Aug. 1908 Robertson, J. L., M.A., 35 Hutcheson-st., Moonee
Ponds
- Jan. 1903 *Roger, W. H. A., 19 Wattletree-rd., Armadale Ent. (Lep.)
- May 1904 Rollo, Miss J., 65 Tivoli-road, South Yarra
- Nov. 1910 Rosenhain, Oscar, 482-484 Collins-street, Melb.
- Mar. 1899 Ross, J. Andrews, Station-street, Jumbunna
- Nov. 1896 Ryan, Dr. C., 37 Collins-street, Melbourne ... Ornith., Oology
- Jan. 1910 Ryan, Dr. E., Collins-street, Melbourne
- Jan. 1910 Ryan, Dr. T. F., Nhill
- Sept. 1908 Sarovich, Mrs. C. J., Beach-st., Port Melbourne
- May 1880 o*† Sayce, O. A., A.L.S., "Staplehurst,"
Harcourt-street, Hawthorn ... Crustacea
- Jan. 1909 Scott, Alex. L., 27 Evelina-road, Toorak ... Geology
- Nov. 1885 Scott, W., 54 Fletcher-street, Essendon
- July 1885 † Searle, J., 274 Collins-street, Melbourne ... Entomotraca

- Oct. 1909 Semple, Dr. W. H., Kilmore
 Sept. 1910 Shaw, Dr. H. E., F.E.S., Healesville ... Entomology
 May 1889 *† Shephard, J., Clarke-st., South Melbourne ... Pond life
 Oct. 1909 Simpson, S., State School, Glenroy
 July 1884 * Simson, Mrs. J., "Trawalla," Toorak
 July 1884 Simson, Miss, "Trawalla," Toorak
 May 1905 Skeats, Professor E. W., D.Sc., Univ., Carlton ... Geology
 June 1906 Slack, T., State School, Bacchus Marsh
 May 1880 o† Sloane, T. G., "Moorilla," Young, N.S.W. Ent. (Col.)
 May 1902 Smith, A. J., Port Albert
 July 1910 Smith, Sydney, 45 Hoddle-street, Richmond
 Dec. 1901 Somers, Dr. J., Edgeworth, Mornington
 Oct. 1903 Somerville, W., 16 Bellevue-street, Richmond
 Jan. 1903 Spark, J. M., Harding-street, Surrey Hills
 Aug. 1887 *† Spencer, Professor W. Baldwin, C.M.G., D.Sc.,
 M.A., F.R.S., University, Carlton ... Biol., Zoology
 Feb. 1882 † Spry, F., Napier-street, South Melbourne ... Entomology
 Nov. 1908 † St. John, P. R. H., Mason-street, South Yarra Botany
 Jan. 1908 Stephen, W. J., 32 Robinson's-road, Hawthorn
 Nov. 1880 Stickland, J., Latrobe-street, Melbourne ... Pond life
 July 1885 *† Stickland, W., Latrobe-street, Melbourne ... Pond life
 Nov. 1900 *† Sutton, Dr. C. S., Rathdown-street, N. Carlton Botany
 May 1910 Sutton, Dr. Harvey, Education Dept., Melbourne
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 Brunswick ... Geology
 Jan. 1911 Sweet, Miss G., D.Sc., Melbourne University
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 Oct. 1909 Thiele, E. F., Doncaster ... Ornithology
 Aug. 1910 Thomas, F. J., Lindenow
 Jan. 1908 Thomson, Capt. W. C., Ascot, Brisbane, Qld.
 Feb. 1904 Thomson, Dr. J. R. M., Violet Town
 Sept. 1900 † Thorn, W., Mines Department, Melbourne
 April 1883 *† Topp, C. A., M.A., LL.B., Royal-crescent,
 Armadale ... Botany
 Aug. 1907 † Tovey, J. R., National Herbarium, South Yarra Botany
 April 1904 Trebilcock, R. E., Wellington-street, Kerang ... Ent. (Lep.)
 June 1904 Turner, Miss E. J., "The Grange," Domain-rd.,
 South Yarra
 Jan. 1910 Twyford, J., 9 Villiers-street, Elsternwick ... Microscopy
 Oct. 1910 Van den Houten, L., Salisbury-street, Caulfield
 Dec. 1908 Walcott, R.H., F.G.S., National Museum, M. ... Mineralogy
 Nov. 1891 Walker, J. B., Mackillop-street, Melbourne
 Jan. 1908 Wallace, Rev. H., Violet Town
 June 1904 † Waterhouse, G. A., B.Sc., F.E.S., Royal Mint,
 Sydney, N.S.W. ... Ent. (Lep.)
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 Hawthorn
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 South Yarra ... Botany
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 Jan. 1901 Williamson, H. B., 52 Gertrude-st., Geelong ... Botany
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 July 1904 Wilson, J., Moorabbin Pharmacy, Cheltenham
 May 1880 o*† Wisewould, F., Imperial Chambers, 408
 Collins-street, Melbourne

July 1902 Wisewould, Miss G., Seymour-road, Elsternwick
 Oct. 1898 Wollen, A., Nar Nar Goon Orn., Ent.
 Mar. 1908 Wrigley, Miss E., 117 Racecourse-road, Newmarket

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Pomona Journal of Entomology, Pomona College, Claremont, Cal.

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